AMERICAN JOURNAL

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Entered at the Post Office at St. Louis, Mo., as Second Class Matter. PUBLISHED BY THE C. V. MOSBY COMPANY, \$523-25 PINE BLVD., ST. LOUIS, U. B. A.

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The American Journal of Obstetrics and Gynecology

Vol. XVIII

St. Louis, September, 1929

No. 3

Original Communications

PRESIDENTIAL ADDRESS

SOME LITERARY DOCTORS OF MEDICINE*

By C. JEFF MILLER, M.D., NEW ORLEANS, LA.

The evolution of American gynecology, as more than one writer has pointed out, may be traced in the addresses of the presidents of the American Gynecological Society. Through the years, from the days of Fordyce Barker and the founding of the Society, the present has been considered in them, the past reviewed, and the future painted, until in 1921, in one of the most brilliant medical addresses ever delivered in America, Chipman of Montreal gave us the whole subject in epitome. So I shall not endeavor to do again what has been so ably done before me. On the other hand, my choice of subject is limited by my own limitations. I cannot present to you, as other presidents have done, new discoveries in the laboratory, new methods of diagnosis, new operative procedures. I am that step-child of modern medicine, a mere clinician, translated to a special field, if you will, but still a clinician.

I propose, therefore, to speak to you today from this chair which has been honored by the men who have preceded me in this office and which I now occupy by your gracious mandate, on a subject only remotely connected with medicine. Sampson, you will remember, devoted practically the whole of his presidential address in 1922 to a consideration of the value of hobbies for all men, and chiefly for physicians. Well, my hobby has always been what physicians have achieved when they turned to follow what Goldsmith, I think, called "the draggle-tailed muses," and with your permission I shall pass by the science and art of gynecology and obstetrics, and speak to you today on one phase of that theme.

 $^{^{\}circ}\text{Read}$ at the Fifty-fourth Annual Meeting of the American Gynecological Society, Old Point Comfort, Va., May 20, 1929.

Note: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

Since the time of Greek medicine, there have been physicians as eminent in literature as they were in their profession, and from the time of Thomas Linacre, English medicine and literature have likewise often joined hands. Linacre was physician to Henry VIII, to Wolsey, Colet, Warham, Box, More, Erasmus, Lily, and a host of other famous men. He ranked high among the doctors of his own day, and he has come down to posterity as the founder of that noble organization, the Royal College of Surgeons. But literature was his love, and he gave up his rich practice and took Orders, not that he felt a vocation but that he might devote himself to the revival of learning in England. As Osler says, he sought to restore to English medicine the uncorrupted spirit of Greece, and even a cursory survey of his work shows how well he succeeded in his self-imposed task.

We need not seek for writing of real merit only in the field of pure literature. In this day Barrie's libel no longer holds, that the scientific man is the only man now writing who has something to say, and the only man who does not know how to say it. I deny that absolutely. We have many physicians who write with distinction on medical themes, whose literary achievements are quite as notable as their professional skill. I need mention only a few: Sir Berkeley Moynihan, who writes on even the most strictly medical subjects with lucidity and charm; Sir Humphrey Rolleston, who has clothed his physic with philosophy and wisdom; Sir Clifford Allbut, who at eightyfive produced Greek Medicine in Rome, a book as remarkable for its scholarship as for its contributions to medical history; Fielding H. Garrison, who has done notable work in the same field; Harvey Cushing, that brilliant surgeon and accomplished litterateur, who in all of his writings achieves the excellence we have come to expect of the author of The Life of Osler: finally Sir William Osler himself, Regius Professor of Medicine at Oxford, and Stephen Paget, son of the great Sir James.

I wish that Stephen Paget's Confessio Medici could be put into the hands of every young physician before he begins to practice, and I wish that he would read, mark, learn, and inwardly digest it. It is a picture of the medical profession at its highest and best, sprung from the priesthood, devoted to the succor of mankind, a calling, not a trade, whose rewards cannot be reckoned in gold and silver, and whose disciples are called to it as truly as St. Francis was called to follow his dear Lady Poverty. He is a wise man, this old physician, who tells us what he has learned, so far as he has gone, from his life, so far as it has gone, who knows the frailties of humanity and does not ignore them, but who points above them and beyond them to the ideals that can be striven for even though they be not wholly attained. This is a medical book, intended principally for medical men, but if it be not true literature also, then Apollo has blinded my eyes.

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Gilbert Murray, the great classicist whom he succeeded as the President of the Classical Association of Great Britain, said of Sir William Osler that "he represents in a peculiar way the learned physician who was one of the marked characters of the seventeenth and eighteenth centuries, and he stands for a type of culture which the Classical Association does not wish to see die out of the world,-the culture of a man who, while devoting himself to his special science, keeps, nevertheless, a broad basis of interest in letters of all kinds." Osler has left medical papers of value on many subjects, and he wrote a textbook which is still the standard for all who have come after. Indeed, he touched nothing which he did not adorn. But his peculiar genius is best exhibited in his miscellaneous addresses, his occasional papers and his lay sermons. In his presidential address at Oxford, almost his last public utterance, on The Old Humanities and the New Science, he apologized for his small Latin and less Greek, but to us he seems extraordinarily well read in both, read in the truest sense, in that he absorbed their culture and bathed himself in their spirit. He went far beyond the sine qua non set down by Bagehot, that any writer of English, if he know not Latin and Greek, must at least have a strong conviction that both languages existed. In this special address Osler reveals himself as the true humanist, forever interested in the interests of humanity, as he strives to recall to the real values a war-torn world which has forgotten them, and as he pleads for that civilization which Hippocrates pictured, in which love of humanity, philanthropia, shall be joined with love of the craft, philotechnia, and thus wisdom, philosophia, shall be justified of her children.

Like Stephen Paget, Osler has his own philosophy. Equanimity, he taught, is the way of life, and work is its master word, and with these as guards one may "bear success with humility, affection of friends without pride, and be ready when the day of sorrow and grief comes to meet it with the courage befitting a man." How well that simple faith supported him we know when his own trial came, when his beloved and only son fell on the blood-stained fields of France, one of that company of gallant gentlemen who gave up their lives that mankind might live.

All of Osler's writings are "memorable speech." They are characterized by a lucid and beautiful style, a style which is illuminated by a sort of high clarity and which exhibits a most astonishing fecundity of quotation and allusion. Like Francis Bacon, he seems to have taken all knowledge for his province. His pages are strewn with inverted commas, but even more striking are his allusiveness, his indirect references and almost unconscious tags of speech, which show not the learning of a pedant but the intimacy of a lover. The story goes, you know, that two examinations can be set upon Osler, one on his pathology and

therapeutics, the other on his quotations and references, and that the latter is more difficult to pass.

C. MacLaurin and Joseph Collins represent a stream of tendencies in modern literature which, in spite of its brilliance, I cannot admire unqualifiedly. The former is an Australian surgeon who has written two quasi medical books entitled Post-Mortem and Mere Mortals, in which he analyzes the diseases of the great figures of literature and history. It is a Zola-esque performance which gives evidence of a vast amount of historical and general information, plus a very ingenious speculative ability, but for my own part, I could wish that the author had devoted his not inconsiderable talents to more worthy things. No doubt most of the characters whom he depicts were extremely unpleasant persons, but why dwell on men who were lusters and women who were harlots, and why, if hereditary syphilis is one's obsession, as it seems to be this author's, why not present the subject as a medical thesis rather than in a book presumably intended for lay consumption?

For the last several years Dr. Collins has been turning out books which purport to analyze, from the standpoint of a practicing neurologist, current tendencies in literature and life. Unfortunately he looks at both with an eye jaundiced by his own specialty, which invalidates, it seems to me, most of his reflections, for he utterly lacks that aspect of impartiality which Matthew Arnold declares to be the first requirement of the true critic. His recent performances, too, incline me to agree with the commentator who remarked that an excellent journalist was lost to the world when Dr. Collins took up medicine.

The medical men who have written their autobiographies have in no wise added to their reputations by these performances. T. A. Emmet and Marion Sims performed surpassing services to gynecology, Sir James Paget and S. D. Gross were great surgeons, Edward Trudeau revolutionized the treatment of tuberculosis, Wilfred Grenfell succored a people, David Livingstone began the civilization of a continent, yet, with the possible exception of Livingstone, their books, from a literary aspect, represent only a succession of missed opportunities, however interesting they may be from other standpoints.

The medical biographers of medical men have done their task rather better. Sir Rickman John Godlee, who wrote *The Life of Lord Lister*, was handicapped by two things, that he was Lister's nephew, which made him, we may assume, lean over backward in order to avoid the charge of bias, and that by Lister's own repeatedly expressed desire the book was to be a record of his work and not the story of his life. The result is that the human touch is entirely lacking and that the gloom in which Lister's life went out seems a veritable twilight of the gods.

Quite otherwise is the story of Sir James Mackenzie by R. MacNair Wilson. The Beloved Physician is the record of a life of simple good-

ness and unswerving devotion to duty. From the day that he was attracted to medicine by the colored lights that shone in a chemist's window, Mackenzie consecrated himself, you will note the word, to general practice, and during the course of that practice he taught the medical profession how to study disease and how to evaluate symptoms, and he became himself the world's leading authority on affections of the heart.

The Life of Sir William Osler, by Harvey Cushing, to my mind is one of the most extraordinary literary achievements of our day. That a book in two volumes and more than thirteen hundred pages can, in this age, hold the attention of the reader from start to finish is one marvel. That a biographer who knew his subject as intimately as Cushing did Osler, who stood in the affectionate relationship that he did to him, can keep himself entirely out of the picture, is another. And that, in a book that is of necessity crammed with medical detail, there can be drawn the likeness of such a radiant personality, the record of such gracious living, is the third. The Life is dedicated to medical students, with the hope that something of Osler's spirit may be conveyed to those of a generation that did not know him, and no one, I think, can read it without feeling how beautifully Cushing has wrought his labor of love and how adequately he has fulfilled his desire.

To turn to the fields of pure literature, there is no more interesting figure in them than Sir Thomas Browne, the seventeenth century physician who practiced medicine for a profession and wrote his books as a recreation. His life, though not quite the miracle he himself makes it out to be, is really rather extraordinary. After his university days and his travels abroad, he married a lady "so perfect that they seemed to come together by a kind of magnetism," who bore him ten children and with whom he spent forty happy years. The storms of Civil War raged about him but he remained undisturbed in his country seat. A king lost his throne, a king lost his head, but Sir Thomas "catched the opportunity to write of old things." The thunder of battle was heard afar off, while he concerned himself with thoughts of the hereafter, suggested by the finding of a funeral urn, and speculated as to why elephants have no joints and why storks live only in free states, and why America, being full of beasts of prey and other noxious animals, though by what passage they came over he knows not, should so strangely lack that most necessary creature, the horse.

The Religio Medici was written to defend himself and his professional brethren from the ancient imputation of irreligion, and, as was the way in that informal age, was published without his knowledge and in several unauthorized editions before his own version appeared in 1643. It had an extraordinary popularity in his day, a popularity which still continues among a most heterogeneous group of persons, though I know of none who, like Sir Kenelm Digby, found it necessary to read it

through in one night and forthwith write a criticism of it amounting to three-quarters of its length.

Its charm is twofold. Part of it is certainly due to the recollection of the serene, happy gentleman who, in the spirit, at least, never passed from the shadow of Oxford's dreaming spires. He lived his life, he tells us, shaking hands with delight, his conversation, like the sun's, with all men. He is so modest that he is quite willing to bring up the rear in heaven, so charitable that he can sympathize with all humanity, can endure all theological systems,—mirabile dictu in that age,—can admire his enemies, can feel a sort of compassion for the devil, and can picture in the hereafter a life of toleration where the damned would be released from their tortures and where one limbo would be reserved for the virtuous heathen. Indeed, he is happy enough to pity Caesar if he may have the things he asks of life, the peace of his conscience, the command of his affections, and the love of God and his dearest friends.

That is one aspect of the charm of Sir Thomas Browne. The other is his majestic style, scarcely equalled again in English literature, with its old-world Latinisms, its stately rhetoric, its mysticism and its humor, its pomp and circumstance, its noble rhythms, like the full stops of a cathedral organ or the ancient chants of a chapel choir.

MacLaurin, as might be expected, dismisses *The Religio* with the statement that it is a farrago of quackery, mysticism, credulity and astrology, written in gorgeous and unnecessarily obscure language. But one whose eyes were less blinded loved it above all books. To Sir William Osler it was next only to the Bible, and it went with him all the way, *comes viae vitaeque*, until finally it was clasped in his hand as he lay at rest in the shadow of the Lady Chapel near St. Frideswide's Watching Chamber, with the scarlet gown of Oxford about him and the peace that passes understanding on his face.

John Locke, the famous author of *The Essay on the Human Understanding*, the apostle of common sense in philosophy, was a physician and an excellent one. William James, though he never practiced, not only completed his medical course at Harvard but for many years taught physiology and comparative anatomy there, passing from those departments to psychology and thence to philosophy. If, as the critics say, his famous brother Henry is a novelist who writes like a psychologist, certainly William James is a psychologist who writes like a novelist. He raised the standard of intellectual honesty in America, he humanized philosophy, he helped many a doubting soul to feel a new glow of hope and courage, and I know of no writings, scientific or otherwise, which can be read with more of the pleasure one accords to true literature.

Havelock Ellis, the dubious parent of much of the present thought and social practice concerning sex, took a medical degree in order, apparently, that he might foreswear that career and become, in his own words, a physician of souls. I confess that I am too much prejudiced against Dr. Ellis to evaluate his spiritual ministry, and I also confess to a most unchristian glee at his own acknowledgment in his latest book that in spite of his amiable intentions toward the world, he has not received from its people the cooperation he had the right to expect.

Decidedly more of the earth earthy is Samuel Smiles, who practiced medicine for two years until he found it more profitable to write Self-Help, Thrift, Character, and other predecessors of the accumulated successful lives now presented to the public in The American Magazine. He was the popular apostle of a sort of universal Jack Hornerism, a cheerful optimist who headed a school that believed in the equable distribution of life's prizes, and, judging from his early record, he undoubtedly did more good there than he could have done in medicine.

Erasmus Darwin, grandfather of the famous Charles, practiced medicine as his life work and practiced literature between visits, in the form of poetry and treatises on philosophy, botany and education. Charles Darwin, many of whose scientific generalizations his grandfather had anticipated, began to study medicine, but anatomy disgusted him, the operating theater horrified him, and materia medica brought to his mind only cold, breakfastless hours devoted to the properties of rhubarb. So he turned his attention to other things, and The Origin of the Species followed in due course. Thomas Henry Huxley began to study medicine because medicine was in the family, but the abstract sciences of biology, zoology and comparative anatomy soon claimed his interest. To the end of his life, however, he frequently appeared as lecturer before the College of Surgeons, and certainly the medical profession may lay some claim to this man who introduced a new school of biologic inquiry and whose whole performance, like William James's, lies in the realm of real literature.

John Arbuthnot, member of the Royal College of Surgeons, harveian orator, court physician, who helped Pope "through that long disease, his life," in his portrait of John Bull was the first to depict the English type, now flung to the Seven Seas. In Martin Scriblerus he has added an unforgettable portrait to the gallery of English humorous characters. He was, however, singularly careless of his literary reputation, for his witty writings were anonymous, his friends altered them as they chose, and his children made kites of his papers.

The first book I ever owned, if you will forgive the personal reminiscence, is still as dear to me as it is, I am sure, to many of you. I refer to Rab and His Friends, that charming volume of sketches written by Dr. John Brown of Edinburgh, the pupil and later the assistant of the famous Syme. The memoir of his father is as beautiful as any similar memoir in English literature, but it is not as touching as the sketch which gives the book its title. I know that none of you, if you have ever read it, can forget that hospital ward where the sweet old country-

woman lies dying, cradling in her empty arms the fancied form of the little child she had lost, watched by the faithful dog, nursed by her inarticulate, heavy-handed husband, whose touch to her was always gentle, and brooded over by the great surgeon, helpless to stay her dread disease.

In this same volume is that classic of childhood, Marjorie Fleming, the story of the wee wifie who was the devoted friend of Sir Walter Scott. She is revealed in her journals and letters, this little maid with her quaint philosophy and her bad spelling, her confession of her sins and her personal views of the devil, who made her behave so ill in God's most holy church, and who must have something to do with the multiplication she finds so difficult. How she lives, this child with her sweetness and her gayety, and how the old physician lives, too, in his tender comments and his loving interpretation of her short, beautiful life!

Medicine, says Sir Humphrey Rolleston, may be said to have refused the overtures of Oliver Goldsmith, and teaching, the law and the Church would have none of him either. Indeed, so the tale goes, the Bishop before whom he appeared for ordination stated very bluntly that a candidate who would clothe himself for such an occasion in scarlet breeches must be constitutionally unadapted to Holy Orders. Throughout his life, almost to its end, he continued his efforts at medicine, although the College of Surgeons rejected him and the naval boards declined to appoint him. On his last attempt at private practice he wrangled with the apothecary over the dosage, and the patient, quite wisely we cannot help feeling, sided with the latter; Goldsmith thereupon vowed never to practice again, in which resolution he was warmly applauded by Topham Beauclerc, who advised him, if he were resolved to kill, to concentrate on his enemies. Finally he precipitated his own end by an attempt to prescribe for himself, the fever potion being apparently, like Pet Marjorie's multiplication of seven times seven, what nature itself couldn't endure.

But if he failed in his efforts at the various professions, how well he succeeded when he fled to literature. Aside from his didactic poetry and familiar verse, he has left a series of essays which in real charm approach Charles Lamb's; a comedy, She Stoops to Conquer, which is still being acted before delighted audiences; and a novel, The Vicar of Wakefield, which contains the portrait of one of the best loved characters in English fiction. But he is no more beloved than is the simple, generous, loving, improvident man who created him, and who, if he did not adorn medicine, is one of the bright stars in the crown of English letters.

Like Goldsmith in many ways, though totally unlike him in the distinction he achieved in his profession, is Oliver Wendell Holmes. He began his general practice in Boston, with the motto that the smallest

fever would be thankfully received, and for thirty-five years he was professor of anatomy and physiology at Harvard, occupying, as he said, not a chair but a whole settee. He anticipated by twenty years the work of Semmelweis on the contagiousness of puerperal infection, though unfortunately he did not follow it to its logical conclusion. As a lecturer he was so successful that he was always assigned the last hour of the day, because at that time no one else on the faculty could keep the students awake. Brander Matthews suggests that his own description of Paré may well be applied to him, good, wise, quaint, chatty, shrewd. Certainly he was a gentleman and a scholar, a physician learned in the lore of his calling, a man of the world in the highest sense of the term, and, as Howells says, universally interesting because he was universally interested.

How, doing the work that he did, Holmes managed to write at all, let alone so much and so well, is the chief wonder of his literary career. He was in turn poet, essayist, and novelist, though his novels are simply medicopsychologic studies, conceived by a physician and composed by an essayist, and owing whatever merit they may possess to the flavor of Holmes' own personality.

It is as an essayist, however, that he is at his best. In *The Breakfast Table Series*, frankly modeled on the eighteenth century type, we have the author himself, a whimsical old humorist, looking at life through his professional spectacles, regarding the world and its people from all angles, but always with kindness and urbanity, never with acerbity and scorn, and talking about himself with a delight that is wholly contagious. He had always been, he said, good company for himself, and surely in these essays he reveals himself as delightful company for others.

S. Weir Mitchell, at fifty-three, when he was one of the world's leading neurologists, wrote his first novel, having been advised by Holmes, while he was still in his twenties, to hide literature in his desk until medicine were full grown. At that age, when medical success made long holidays possible and his natural inclination made idleness impossible, he turned to what, except for stern need, would have been his life work. We must, as Osler says, go to other centuries to find such a combination of a life devoted to the best interests of science with literature and social distinction. He wrought not with the haste of a journalist but with the deliberate leisure of a man of letters. He has a distinction of style possessed by few of our romancers, and though, like Holmes, he was too much of an essayist ever to find himself in dialogue, his historic backgrounds are unfailingly correct, and it is only because the physician has overshadowed the author that his literary fame is not greater. He knew as much of evil and sorrow as other men, indeed he knew more than most, but he always lived "in the sunshine

of life," and the tone of his books is a tonic in an age sick and weary with literary perverts.

Tobias Smollett, in the early eighteenth century, though he practiced most of his life, was never a successful physician. On the other hand, he ranks with Richardson and Fielding as a pioneer in the development of the novel form in English. Both in Roderick Random and in Ferdinand Count Fathom he makes use of his experiences as an apprentice in medicine and as a naval surgeon, presenting them with what he considers wholesome frankness but with what seem to us only brutality and ugliness. He was in a constant state of rebellion against life, and only toward the end does he begin to soften, so that his books, powerful and virile though they be, are not pleasant reading. Smollett did at least two things for the English novel: under the influence of the Spanish School he introduced the picaresque or rogue element, and in his painting of characters as types, with their superficial oddities of manner and speech emphasized, he profoundly influenced two of his greater successors, Sir Walter Scott and Charles Dickens.

Charles Lever, who was characteristically Irish in spite of a wholly English ancestry, with great difficulty obtained a degree from Trinity College, and was immediately appointed to various public offices, probably, it has been unkindly suggested, because cholera was epidemic and the medical boards could not be very particular. Even a fair practice failed to keep him in funds, and he turned to literature, pouring out, for the rest of his life, a succession of pot-boilers of which Harry Lorrequer and Charles O'Malley are probably the best known. It was his misfortune to be an author without a literary avocation, and it is characteristic of him that late in life he was made consul of Trieste by Lord Derby, on the ground that the office carried six hundred a year for doing nothing, and he was just the man to do it.

Sir Arthur Conan Doyle, before he turned to literature, did general practice and then ophthalmology. He had a waiting room, he says, but he found out very soon who did the waiting, and he thereupon decided that even though literature did not promise much, medicine seemed to promise less. Too little has been written about Conan Doyle as the author of historical novels, in which his best work has been done and in which his heart really lies, for it is as the creator of Sherlock Holmes that the world chiefly knows him. He cannot equal Poe in the invention of the macabre and horrible, he cannot equal Wilkie Collins in the portrayal of character, but he has none the less created a personage known to the whole world in the inspired detective with his disorderly room, his infinite and uncanny knowledge, his mouse-colored dressinggown, his addiction to cocaine, his love of music, his consumption of shag tobacco, and his faithful friend Watson. One wonders how the practice of that particular physician must have fared with its constant interruptions, but we should be willing to take our chances with his medical skill in order to hear more of his stories. It was a real stroke of genius which created him; the figure of Holmes has verisimilitude because he exists. With Watson, we fall on our knees. Like him, we expose our stupidity to permit the sun of Holmes' brilliance to shine. Like him, we stultify ourselves gladly that he may continue his deductions. Plain clothed detectives owe Sir Arthur no thanks, for he has created in the minds of the public an illusion of their ability quite impossible of attainment. Indeed, he himself had the curious experience, when he was in Egypt at the time of the Soudan Campaign, of finding that his Sherlock Holmes had been translated into Arabic and issued to local police as a handy and reliable manual of conduct.

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Since the War Sir Arthur has turned his attention to spiritualism, thereby adding, as Huxley once said, fresh terrors to death. I admit that in his revelations of the hereafter he speaks with the authority of thirty years of honest investigation, but for my own part I prefer him as the creator of the decidedly earthy Holmes and his fidus Achates Watson rather than as the interpreter of the heavenly kingdom.

Time does not permit more than a passing mention of the group of physician-novelists who are writing today. It includes Henry Rowland, H. deVere Stacpole, Somerset Maugham, Warwick Deeping, and Francis Brett Young. Warwick Deeping was in active practice when a successful first novel, *Uther and Igraine*, warranted his turning to literature as a profession. During the War, however, he returned to medicine, serving in the Medical Corps both in the East and in France. More than twenty novels were behind him when in *Sorrel and Son*, a vital and beautiful study of the devotion of a father to his more than motherless child, he struck a new note which he has continued in all his later books.

Somerset Maugham's first novel, Liza of Lambeth, is a piece of stark realism based on his experiences as house physician at St. Thomas' Hospital, on the edge of the London slums. Of Human Bondage, his most ambitious work, is practically an autobiography, and its fidelity to life and its gallery of living portraits, many of them reminiscent of his brief medical career, make it one of the outstanding novels of our age. Whether, as critics have declared, it belongs in the class with Tom Jones and Pendennis is a matter of personal opinion, but its worth cannot be denied. Mr. Maugham is equally as successful as a dramatist, his plays ranging from drawing-room comedies to the powerful if unpleasant Rain. One wonders, however, why, having shown what he could do, he saw fit to write or his publishers saw fit to issue his latest effort, Ashden or the British Agent. If he is attempting to assume the mantle which Conan Doyle seems to have laid down, most respectfully do we inform him that his shoulders are not fitted to bear it.

Finally there is Francis Brett Young, to my mind the most promising of the whole group. Because he was the son of a doctor he studied

medicine, and because his literary career seemed to promise little he continued to practice until he was invalided home from the War. His first two books had the unique distinction of being rejected by thirtytwo publishers each. His first accepted books had excellent reviews and no sales, chiefly because they did not fit the mood of a world mad with the lust of war. Now, however, he is publishing novels of real distinction, and the long neglect of the critics has meant that he has been free to work out his own salvation because he has not had to sub. mit himself to their importunities. His early South African stories have atmosphere, The Young Physician has realism, The Dark Tower is a study in shadows, but Love is Enough and My Brother Jonathan are pages of life. The figments of the first books have become living, sentient men and women, and the forge of life is making character. Mr. Young has a wholesome sanity of outlook in an age that in many of its literary fashions has gone quite mad, and he writes with a beauty of style and a precision of touch scarcely equalled in this generation of novelists. He is quite as happy in his background, and to me not the least charm of his books is his pictures of the English countryside, where the wild roses blow in the hedgerows, where the larks sing, where the hilltops melt into the clouds, a countryside whose sweet smells and sights and sounds are in contrast to the towns of the Black Country just beyond, with their stacks belching smoke and their furnace fires red against the sky.

They are an interesting group of men, these physicians and would-be physicians who have turned to literature for their recreation or for their life work. Many of them have been an honor to the profession, many of them have enriched the field of letters, a few have been equally distinguished in both callings. And I shall feel that I have not spoken to you today in vain if I can persuade you sometimes, when the cares of life weigh heavily upon you, those cares that are the inevitable lot of those of us who have chosen to follow medicine, to turn to the ripe wisdom of Stephen Paget and Sir William Osler, to the quaint tolerance of Sir Thomas Browne, to the wholesome sanity of William James, to the sweet gayety of Pet Marjorie, to the tender Vicar of Wakefield and the kindly old Autocrat, and to those more modern physicians who can help us to forget

"The lyf so short, the craft so long to lerne,"

and so who can give us fresh courage to bear the load.

Note: I am indebted to Dr. Pierce Butler, Dean of Newcomb College, for many helpful suggestions; to Miss Mary Louise Marshall, Librarian of the Orleans Parish Medical Library, and Mr. Robert Usher, Librarian of the Howard Memorial Library, for their assistance in procuring for me obscure references and out of print books; and to my secretary, Miss Elizabeth M. McFetridge, without whose assistance this paper could not have been written.

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MYCOTIC VULVOVAGINITIS

By Nicholas W. Popoff, M.D., Francis Ford, M.D., and W. Harold Cadmus, M.D., Rochester, New York

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(From the Departments of Pathology and Obstetrics, Highland Hospital)

THE case of mycotic vulvovaginitis here reported was encountered in a woman of thirty-five years of age, who first noticed the clinical symptoms of the disease at the beginning of the sixth month of pregnancy. The chief complaint at this time was the marked pruritus of the vulva and vagina, a burning sensation in the vagina, and some discharge. The symptoms were persistent and progressively disturbing, and the patient's husband, an obstetrician himself, began to worry and in order to settle the matter of diagnosis he brought to the laboratory swabs from the vagina. The following data covering physical examination were obtained:

Patient: primipara, last menstruation normal, January 1, 1928. Both family and personal history as far as the subject under discussion is concerned was practically negative. Menstrual periods began at the age of thirteen years and were always regular and without disturbing complications. During the first three months of pregnancy, nausea and vomiting were noted. About the early part of June, or at the beginning of the sixth month of pregnancy, the first signs of pruritus about the vulva were noticed. This began as a thin yellowish-white discharge, which at first caused little pruritus, but which was rather profuse in amount, requiring the wearing of a napkin constantly. Thin in the beginning, this discharge gradually changed in character, becoming more consistent, thicker and somewhat cheesy and granular in appearance. Careful examination of the vulva and vagina revealed the presence of irregularly distributed lumps of white, opaque, thick exudate. Gentle rubbing over the vagina with gauze was sufficient to remove these lumps of exudate, and after removal of the exudate no ulcerations or bleeding areas were noted, but the mucosa appeared markedly inflamed, red, and very painful on touch. The same, but less pronounced, pathology was found in the vulva.

Laboratory Examination.—On first examination, the vaginal exudate appeared strongly acid and smears showed budding vegetative forms of the yeast together with a long thick Gram-positive bacillus of the type of Döderlein's vaginal bacillus. The urine was slightly acid, but free of sugar. The efforts to identify the yeast yielded the following results:

In liquid media (nutrient broth) the organisms grew with the production of sediment and collar formation, but no pellicles were seen. No coagulation of litmus milk or gelatin liquefaction was noted. The gelatin stab growth had a rather typical inverted pine tree appearance produced by long, fine, hair-like mycelial extensions into the media along the line of stab. On Sabouraud slants, after four days, the growth appeared white, creamy, soft, elevated and with a clearly defined border. In the older cultures mycelial extensions beneath into the medium were observed but no aerial hyphae were found and no surface mycelium noted. A few of the tubes, after from eight to ten days of incubation, showed a very slight greenish tinge. Giant cell colonies were prepared with the Sabouraud medium in Petri dishes according to the technic of Mackie and after twelve days a whitish, opaque, moderate sized colony was grown. This was surrounded by thickened rounded edges and on

account of a central depression it looked like an inverted saucer. On potato the growth was not abundant and appeared dry and dull grayish-white with no visible villous extensions. The 0.2 per cent lactic acid-near beer agar medium of Grace Hill was found to be of great value. The organism examined was killed by heat at 60° C, in fifteen minutes.

Fermentation tests were done, and, trying to avoid the confusion brought about by Castellani's over-faith in sugar fermentation as a dependable means of identification and classification of yeasts, we followed the conservative advice of Ashford and Mackie and used as key sugars only glucose, levulose, maltose, galactose, and saccharose. The organism in question attacked with acid and gas production glucose, levulose, and maltose, and acid was formed always in galactose and often in saccharose. These results were uniformly obtained by using Enlow's synthetic medium, broth sugar free medium and Hiss serum water medium. The organism was kept in Zweifel's solution of 0.5 per cent lactic acid for a week; when planted again on Sabouraud's medium it grew well and gave the same fermentation reactions.

Smears were stained with the Gram and Giemsa methods and with the supravital brilliant cresyl blue and Janus green-neutral red methods. Unstained preparations in the hanging drop and moist tissue culture-cell methods were also used. The organism appeared as bright, clear-cut yeast cells with a doubly refractive membrane measuring on the average 5 or 6 microns. It contained a well-defined nucleus and one or more vacuoles. Budding took place at or near the end of the cells, and actively growing cultures appeared rather pleomorphic as the result of the presence of smaller sized daughter cells, which on supravital staining took the dye avidly but did not show the inner structures as clearly as did the large mother cells. In the older cultures the vegetative forms had a much smaller nucleus, the cellular contour was sharper and a shell-like envelope was conspicuously seen. Septate mycelia were formed which continued to reproduce by budding only. The lateral and terminal conidia were present but no sporangia or ascospores. The articles of hyphae were straight, clear cut, bright and somewhat rounded and varied greatly in length, some being over 900 microns long. Budding took place near the extremity. These morphologic characters were best observed in moist tissue culture-cell preparations. The development of mycelia depended evidently upon the type of medium used. In fluid media, and especially in plain amniotic fluid obtained later from the patient, hyphae were formed very slowly and were composed of only two or three elongated cells while in the solid media of Sabouraud, and in blood with the addition of amniotic fluid, the mycelia were formed after thirty-six hours and as a rule grew outwardly, resembling in this way the growth of connective tissue explant in vitro. In dying cultures, thin, structureless, presumably sterile hyphae were prominent.

On the basis of the above described cultural, fermentation and morphologic features, the organism in question belongs to the class of fungi imperfecti, family of Oosporaceae, subclass of hyphales, and corresponds to Monilia psilosis Ashfordi or Parasaccharomyces of Andersoni.

It is needless to try to argue about the validity of the present classification of yeasts. The complicated and conflicting classification of Castellani is not shared by all mycologists. (Anderson, Ashford, Pollacci and Nannizzi, Mackie and others.) The classification given by Mackie and Chitre in their splendid work on yeast and sprue published last August in the *Indian Medical Research Memoirs* appears to be simple and comprehensive and puts the organism we are dealing with into

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the group of maltose fermenters, type Monilia psilosis Ashfordi, Class A pathogenie yeasts.

Cases of vulvovaginal thrush of English nomenclature, Soorkolpitis of German and Muguet vulvovaginal of French, reported in the literature are very few in number and only a small number of them have adequate bacteriologic data in regard to the exact type of the yeast found. Castellani's cases of mycotic infection of the vulva, vagina, and urethra are supplied with the best bacteriologic descriptions. This author since 1912 has carried out regular mycologic studies on every case of pruritus, vaginitis, and urethritis. Naturally, as the result of biochemical classification used the list of monilia he found appears unusually long.

It should be noted here that besides monilia groups I, III, IV and V of his ten-group classification he found also among his cases of vaginitis and pruritus of the vulvae cryptococcus, Epidermophyton cruris, Epidermophyton rubrum, oidium, aspergillus, sporotrichum, chladosporium, sterigmatocystitis, vibriothrix, and others. This variability of the yeasts found in both normal and diseased conditions of the vagina (Houlton, Salomon and Harris and Brown) may bring immediately the objection to attributing the pathologic manifestations described to the yeasts. Similar objections, based on the fact that from oral mucosa and the stool of normal individuals fungi were recovered in over 40 per cent, were raised against the pathologic relation of yeasts to sprue and bronchomycosis. However, leaving aside doubts regarding the etiologic importance of Monilia psilosis in sprue and pulmonary pathology, one still finds in the literature clinical observations and serologic investigations (Michel, Benedeck, Hines), as well as animal experiments with feeding and inoculation (Browne and Potter), that prove definitely the pathogenic and antigenic rôle of M. psilosis.

The physical symptoms of mycotic vulvovaginitis and the aspect of the mucosa vary greatly and depend on the case. The vagina, vulva, and skin of the genitocrural region may be affected. On the basis of type, location and pathologic manifestations of the lesion Prof. Le Blaye of Paris gives, in our opinion, the best clinical classification of mycotic vulvovaginitis. He describes the following eight clinical forms:

1. Creamy vaginitis.—This resembles in appearance the oral thrush and is manifested by the presence of white, opaque, thick exudate irregularly distributed in lumps which can be removed without difficulty from the mucosa and does not leave ulceration but shows a red and inflamed mucosa which is painful.

2. Creamy vulvitis.—The character of the mucosa is similar to that of creamy vaginitis but the redness, inflammation, and exudate are less pronounced. This form is usually associated with vaginitis and in case of abundant discharge the perineovulvar region may show intertrigenous or vesiculopustular form of inflammatory involvement.

3. Ulcerative vulvitis.—This is a severe form with superficial ulcerations, pain, lymphangitis, inguinal adenopathy, and occasional mycotic involvement of the bladder.

- 4. Pseudoleucoplakie rulritis.—The mucosa appears whitish and opaque resembling leucoplakia. The curet removes with difficulty the whitish coat with superficial layer of the mucosa, but there is no accentuation in the wrinkling of the mucosa, papillomatosis or the true keratinization that are observed in leucoplakia and in lichenification.
- 5. Exematiform vulvitis.—Exudate is absent and the lesion is manifested by the formation of vesicular pustules which rupture and form small punctiform erosions. The inflammation sometimes extends into the perineum, genitocrural plica and may simulate intertrigo.
- 6. Mycotic pruritus of vulvae or prurigenous mycotic vulvitis.—In this form inflammatory manifestations may be wanting completely and only a few erosions due to scratching may be found. Leucorrhea may give a similar picture. In this form parasitologic examination only can solve the matter of diagnosis. However, if one deals with long-standing pruritus that is not accompanied by lichenification, paleness and atrophy monilia infection should be considered.
- Vesiculopustular cutaneous form.—This affects only the external teguments, the vesiculopustules are small, the vesicular stage is very short and cicatrization is rapid.
- 8. Cutaneous intertrigeneous examatous form.—In the intertrigeneous form the monilia can be found sometimes in the genitocrural plica but the vulva remains negative. Cutaneous involvement may extend into the pubis, anus, genitocrural plica, and even into the internal surface of the thigh.

In accordance with this classification our ease reported here should be classified as type of exudative creamy vulvovaginitis and is doubtless of mycotic monilial origin.

Treatment.—On account of delay in diagnosis and the late stage of pregnancy our case presented from a therapeutic point of view quite a problem, especially during the last month.

In the beginning, for some time a 2 per cent solution of mercurochrome was used and later 20 per cent argyrol. The relief obtained, however, was transient, giving ease from pruritus only for a few hours. In the standard textbooks of obstetries and gynecology that were consulted, nothing definite could be found regarding methods of treatment of mycotic vaginitis in pregnancy, and especially in late pregnancy. In the long list of common antiseptic ointments and lotions prescribed by these textbooks for so-called pruritus we did not find any that would benefit our patient. Speaking of routinization and vagueness in treatment of the problem of vulvovaginal pruritus, one should be grateful to Doctors Greenhill, Davis and Colwell for splitting the big chapter on pruritus into subgroups of specific pruritus and also for giving a thorough clinicopathologic description and a systematic treatment of Trichomonas vaginalis.

Mycologic data on the development and growth of Monilia psilosis and our control studies in cultures and smears give every preference to Le Blaye's alkaline medication over routine antiseptic treatment. As soon as the treatment with 1 or 2 per cent bicarbonate of soda lotion followed by glycerine-starch-borate-soda bicarbonate suppositoria (ovula) was instituted, the patient noticed a great relief and the symp-

toms of burning, itching, and abundant disturbing discharge rapidly subsided. At the same time the control vaginal smears showed disappearance of mycelial, virulent forms with increase in the number of a degraded type of yeast characterized by small nuclei and infrequent nucleation.*

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In order to avoid a possible infection of the vagina by the suppositories themselves, the latter were prepared with aseptic precautions and their bacterial content, which proved to be of harmless saprophytic nature, was checked up by both aerobic and anaerobic methods of culturing. This additional precaution permitted us to use this treatment up to the last week of pregnancy and with no trouble or complications whatsoever. Frequency of application of this suppository method was guided by subjective symptoms and bacteriologic examination and two or three treatments a week were sufficient to keep the patient free of complaint.

To our disappointment we were unable to get a Granugenol-Oil which Prof. Stephan uses with great success in the treatment of mycotic trichomonas and other forms of vaginitis in both pregnant and nonpregnant women. His observations and way of treatment are especially interesting since all of his ten Soorkolpitis cases treated were women of the second half of pregnancy. In his opinion the sublimate-borax-glycerin method is good for nonpregnant women where the speculum can be used and where cleaning with a 1 per cent sublimate solution, drying and subsequent rubbing with a 10 per cent borax-glycerin (or introduction of borax-glycerine capsules) can be applied. In pregnant women, however, on account of increased secretion and vulnerability of the vaginal epithelium this treatment is not sufficient. Granugenol-Oil favors the regeneration of the vaginal epithelium and for this reason it is superior to the borax-glycerin. In pregnant women Stephan uses the following procedure: Gentle cleaning by tampon with 1 per cent sublimate; drying and Granugenol-Oil application. After two or three applications of Granugenol-Oil the vaginal exudate acquires a granular appearance that easily may be taken for recurrence but on microscopic examination it is composed of epithelial detritus and regenerating epithelium. If this granular coat is removed a smooth glistening surface of regenerated healthy mucosa can be seen.

Before finishing our report we wish to point out a few essential and most important features of this case:

- 1. Vaginal yeasts in this case up to the time of delivery were accompanied by Döderlein's vaginal bacillus.
- 2. Mycelial forms appeared in the direct smears at the time when clinical symptoms were most severe.
 - 3. The use of Le Blaye's alkaline-glycerin-sodium borate supposito-

^{*}While the investigation was under way a new case of mycotic vulvovaginitis was noted by one of us (F. F.). This new patient was in the seventh month of pregnancy and reacted most successfully to similar treatment applied.

ries improved the condition rapidly and always resulted in diminution of yeasts at the subsequent examination both in the direct smears and in the cultures.

4. The patient came to labor in good condition. Delivery was spontaneous and no postpartum complications were noted.

5. Amniotic fluid, evidently as the result of vaginal contamination, gave a growth of yeast and the amniotic fluid, per se, used as a medium, did not inhibit the growth of the yeast.

6. From the second day after delivery up to the present time (two months postpartum) yeast cells have not been found in the smears and cultures, the clinical symptoms have disappeared and the child did not show mycotic or any other infection.

Is this remarkable phenomenon of postpartum self-cleaning of the vagina brought about by Metchnikoff's phagocytosis with subepithelial macrophages? Is it the result of the combined action of amniotic fluid and some specific properties of the epithelium? Or, is the whole problem of postpartum cleaning solved by d'Herelle's bacteriophagic phenomenon? These questions still remain unanswered. Without a doubt, however, in addition to the above mentioned factors, the treatment used also played its beneficial rôle in the successful outcome of this case and materially relieved the symptoms during the last part of pregnancy.

Gyllensvärd, N., Two Cases of Absence of One of the Adnexa, Acta obst. et gynec. Scandinav. 7: 258, 1928.

When during a laparotomy one unexpectedly discovers that the adnexa on one side are missing, one may infer (1), that incomplete information was given concerning previous operations, or (2) that there is a malformation, or (3) that the absence is due to fetal or postfetal disease. In 1914 Ogorek collected 97 cases from the literature, and Gyllensvärd reports two additional cases. In the first case the adnexa had been completely absorbed after torsion and necrosis as indicated by scar tissue found in the left upper corner of the uterus. In the second case the author believes spontaneous amputation of the tube had taken place.

J. P. GREENHILL.

THE MORPHOLOGY OF NORMAL MENSTRUAL BLOOD AND ITS DIAGNOSTIC VALUE*

BY SAMUEL H. GEIST, M.D., F.A.C.S., NEW YORK, N. Y.

(From the Gynecological Department and Pathological Laboratories, Mount Sinai Hospital)

CLINICALLY it is often of great importance to be able to differentiate definitely menstrual blood from other types of genital bleeding. In reviewing the work done on the cytology of menstrual blood, it was noted that certain uterine elements were found with a fair degree of regularity; furthermore it was thought that the observations on the vaginal cycle might have a practical value in helping to identify menstrual blood. With these facts in mind this investigation was undertaken in the hope that the correlation of the various factors above mentioned would enable us to differentiate menstrual blood from other types of hemorrhagic vaginal discharge and thus give us an additional diagnostic aid in pelvic diseases.

RÉSUMÉ OF THE LITERATURE

Novak¹ states, ''In addition to blood, menstrual discharge contains a greater or less amount of mucin, desquamated epithelial cells, bacteria and granular débris.'' Deirck recently has shown that there is cyclical activity of the vaginal mucosa characterized by desquamation and cornification in the premenstrual and menstrual phases. It was thought in view of these facts, that a morphologic study would enable us to differentiate menstrual blood from other types of vaginal hemorrhagic discharge.

Else v. der Leyen² studied the fragments of tissue found in the menstrual blood. She determined that during the menses pieces of mucosa containing glands and occasionally stroma resembling decidua, were extruded. The pieces varied from a few cells to centimeter-sized fragments. Her findings enabled her to establish the fact that in normal menstruation a definite amount of uterine mucosa was east off. This question had been under discussion for many years and adherents for both the desquamation and nondesquamation theory were numerous.

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Kate Linder³ also obtained and studied fragments of tissue passed during the menstrual period. She, too, contended that desquamation of uterine tissue was a normal phenomenon and that in the pieces extruded both the compacta and spongy layers were included. She also determined that this mucosal desquamation ceased after the second day of the period. She described one peculiar fragment of tissue as made up of large, round cells of decidual-like structure, with a small nucleus and thick cell membrane, arranged in lamellae. In all probability in view of our results to be noted later on, this fragment was desquamated vaginal mucosa.

Sekiba4 repeated the work of Kate Linder, examining fragments expelled during the menstrual period. He concluded that in the beginning of menstruation, mucosa in small macroscopic pieces is east off. These fragments are rarely found after the first day and practically never on the third or fourth day. In some instances no pieces large enough to be examined macroscopically are passed, while

^{*}Read at a meeting of the New York Obstetrical Society, March 12, 1929.

in others huge fragments may be extruded. Microscopically this tissue can be identified as mucosa containing both stroma and glands. The cells show pyknotic nuclei and the entire fragments are infiltrated with leucocytes. He believes the entire compact layer and portions of the spongy layer are desquamated due to a necrobotic process. The amount of desquamation varies in the individual.

Bohnen⁵ studying uteri to determine the extent of the desquamation agrees with Schroeder that the mucosa both spongy and compacta is desquamated down to basalis. This process is practically completed by the second day.

Stickel and Zondeke investigated the menstrual blood from the hemologic point of view. They found a lower value for all the recognizable blood cells, both red blood cells, white blood cells and also for the hemoglobin. They noted that while there was a leucopenia, there was also a lymphocytic increase and polynuclear decrease. In the vagina the total blood cells were even less than the uterine blood. This phenomenon they accounted for by the fact that as the blood escaped from the cervix, small clots composed of red blood cells and leucocytes were extruded, which affected the total cell count.

Rotter⁷ investigated the morphology of the menstrual blood with the object of utilizing his findings as a help in diagnosis. He studied the white cells and determined that in the menstrual blood there is always a decrease in the total count with a gradual polynuclear increase and a lymphocytic diminution. In the bleeding associated with inflammatory disease during the intermenstruum, the blood presented a leucocytosis and a lymphopenia. In fibromyoma with interval bleeding, the blood extruded had a cell count similar to the peripheral blood. In carcinoma the genital bleeding presented a leucopenia and lymphocytosis. He concluded from these findings that the examination of the genital blood might be of assistance in diagnosing carcinoma and the interval bleeding due to inflammatory diseases.

Heim, in an exhaustive article on the growth of human tissue, found that mucosa obtained during the interval and premenstrual period, is viable. He was able to grow this menstrual mucosa outside of the body. The tiny fragments obtained in the menstrual blood he was unable to grow but he leaves the question open as to whether or not this same resistance to proliferation would exist if he were able to obtain larger sequestra. He points out that the mucosa obtained by curettage represented in all probability the small fragments that later would have been extruded,

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The present investigation was undertaken to determine the value of the histologic examination to differentiate normal menstrual blood from other bloody vaginal discharges.

One hundred specimens have been examined, some few in a complete series from the first to the last day of menstruation, others on one, two or three successive days and of others only one or two samples have been taken. In one case a complete series of a nine-day period was studied. To obtain the specimens a glass tube was inserted in the vagina, just within the introitus and fastened in place with adhesive tape. The women were kept in bed during the entire period. The blood collected was divided into 2 parts, one fixed while fresh in acetic acid 36 per cent, and one in 50 per cent alcohol. In some instances 10 to 20 e.e. were obtained, in a few hours; in others, only ½ to 1 e.e. which we found in most instances ample for our purpose. The material was centrifuged if necessary, imbedded in paraffincut and stained. Hematoxylon, eosin, van Gieson, and occasionally other stains were used. The constituents that were studied particularly were the vaginal and other epithelium, and to a lesser extent, other elements such as the leucocytes, both mononuclear and polynuclear.

The uterine epithelium was found in most marked profusion on the second day of the period. It occurred in 74 per cent of the cases. On the first day it occurred in only 50 per cent while on the third day 54 per cent. On subsequent days with one exception, it was not found. It occurs as small strips of columnar epithelium, at times consisting of only a few cells, well stained and as far as the histologic appearance can determine, viable (Figs. 1 and 2). At other times in long strands with many cells; some well stained, others showing degenerative changes. It occurred also as small groups of glands, sometimes only one tiny gland (Fig. 4A). in others in profusion with tortuous glands and surrounding stroma; while in several instances large masses similar to the tissue expelled in membranous dysmenorrhea were found (Fig. 3). In this latter type, no history of unusual pain was elicited. It would seem that with the first appearance of the menstrual flow uterine desquamation has already taken place, that it becomes more marked on the second day, diminishes on the third and ceases on the fourth day. This is the cycle in the usual four to five day type.

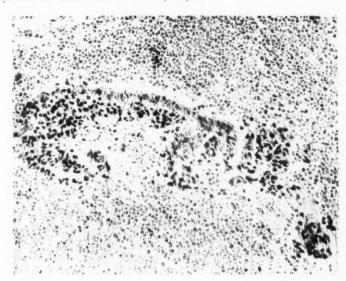


Fig. 1.—X 250. Strip of surface mucosa with small amount of underlying stroma and one small clump of stroma cells to be seen in the right lower corner. Sufficient for diagnosis of menstrual blood.

We also find stroma clumps which occur entirely independent of the epithelium and in varying profusion. They may occur as small clumps of darkly stained cells, oval, round or polygonal, varying from 5 to 20 cells (Fig. 4). The nuclei at times appear normal, well stained, at times showing pyknosis or other evidence of degenerative change. The stroma, however, does not show the same extent of necrosis as the epithelium, though in both cases the viable tissue (that is viable as judged by the histologic appearance) far exceeds the degenerative tissue in amount. The stroma extrusion too shows variations, being more common the second and third days on which days 90 to 91 per cent of the specimens contained stroma in varying amounts either free from or associated with epithelium (Fig. 4A). On the first day, 75 per cent of the specimens contained stroma, while on the fourth day, 50 per cent of the cases were still discharging stromal fragments. The presence of these fragments is extremely characteristic and constant, and though in some instances only one or two tiny clumps may be found, yet they enable one to state definitely that the fluid examined is menstrual blood.

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We see a slight difference between the extrusion of the stroma and that of the epithelium. The stroma desquamation starts as does the epithelium on the first day, then diminishes on the fourth and fifth days. It is evident that the amount of desquamation varies in each individual case and may also vary at each period.

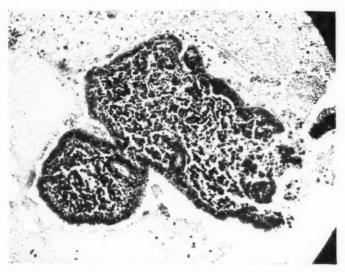


Fig. 2.—X 180. Large fragment of mucosa showing surface epithelium and a few glands, pyknosis of the nuclei; sufficient for diagnosis of menstrual blood.

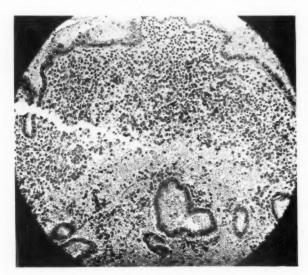


Fig. 3.—X 120. Large plaques of mucosa showing well preserved epithelium both on the surface and in the glands. Decidual reaction in the stroma. Resembles tissue expelled in dysmenorrhea,

This variability may account for the divergent views held by many authors as regards the amount and extent of the desquamation.

It is true that in a certain proportion of the cases (9 per cent) either uterine epithelium or stroma or both was missing. This of course might be due to the fact

that enough material was not examined or that in certain individuals this desquamation does not take place. Corner⁹ has described in monkeys a periodic fundal bleeding not associated with ovulation, and not accompanied by the usual mucosal hypertrophy. It is possible that the absence of the mucosa in this small group of cases

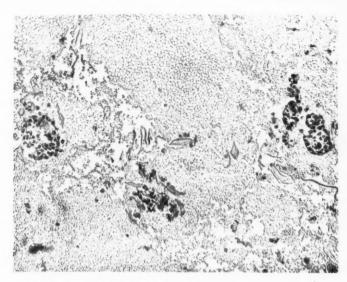


Fig. 4.—X 120. Small stroma clumps of well preserved cells at the right and left of picture; sufficient however to make diagnosis of menstrual blood. Vaginal spindles, broad and compressed, nonnucleated, present.

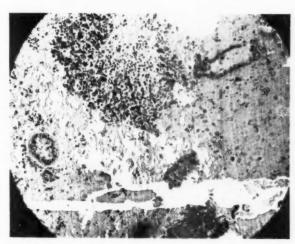


Fig. 4-A.—X 120. Uterine glands, well preserved, two small stroma clumps at lower portion of picture, sufficient to make diagnosis of menstrual blood.

may be explained also on a similar basis, namely, that in certain individuals menstruation takes place without mucosal desquamation, if not at every period, possibly at some of the otherwise normal cyclic hemorrhages. This question will be more fully studied later.

Another striking finding was the presence of desquamated vaginal epithelium.

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rine fact It was difficult to establish a definite rhythm, as it appeared in practically every specimen of menstrual blood. We designated this epithelium as vaginal spindles if it appeared as isolated cells and as vaginal plaques when it occurred in sheets. In the first group, the cells occurred singly as either short flat spindles, containing a small round central nuclei, pale staining with a few taking a more intense stain, as large fat spindles with pale cell body and round central nucleus, or as long sinuous spindles with very faint staining, round or elongated nuclei or with no nuclei. These latter appearing as cell shadows (Fig. 5). This fat spindle had been described by Papanicolaou¹⁰ in the vaginal spreads from pregnant women. Often about them were clumps of bacteria. The vaginal spindles occurred in 95 per cent of the cases on the first and second days; in 82 per cent of the cases on the third day and in 100 per cent of the cases on the fourth day. The individual number of cells varied, in some cases the spindles were numerous, occasionally the slides being covered with them, 50 to 100 in a field, and in other instances they were more scanty, sometimes one only or two to a field.

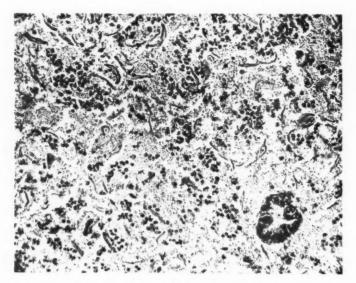


Fig. 5.—X 120. Mass of isolated spindle cells of varying types. Boat shaped, large and compressed, spindles and one small uterine gland well preserved in the lower right hand corner, sufficient to make diagnosis of menstrual blood.

The vaginal plaques varied likewise in their appearance. Three types were observed. In one the plaques were composed of layers of squamous epithelium, varying in number from three to four cells to masses of 100 or more (Fig. 6) and from three to four layers to ten or twenty. Here, too, as in the spindles, the cells are pale staining and apparently nonviable. The second type is represented by clumps or groups of large spheroidal or polygonal cells, probably the variation in the direction of the section making the difference in appearance. The nuclei in both groups are small, round, badly stained and central (Fig. 7). The third variety is seen as strands of cells two or more layers thick, crowded, nonnucleated for the most part; in many the cell markings are gone and these are just strands of cornified nonviable superficial epithelium (Fig. 8). The plaques are not as numerous as the cells of course, but are present in sufficient profusion to be easily found. On the first day, they occur in 50 per cent of the cases, rising on the second day to 72 per cent, dropping again to 55 per cent on the third day, and

to 25 per cent on the fourth day. Whether this cycle is dependent on a true endocrine impulse or is the result of the maceration of the menstrual blood, as yet cannot be determined.

Vaginal smears were studied with the assistance of Dr. A. A. Guttmacher to determine if any menstrual cycle could be identified but we were unable to definitely

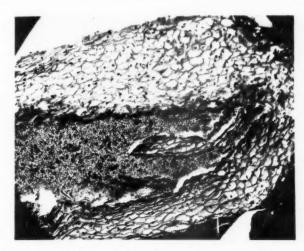


Fig. 6.—X 150. Large fragments of vaginal mucosa. Well preserved cells. Such large fragments as these are uncommon.

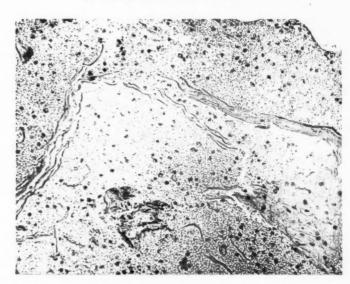


Fig. 7.—X 200. Strips of cornified vaginal mucosa. One showing at its extremity to the right and below, a flat plaque of epithelium cut tangentially.

recognize any consistent rhythm in the cellular variation, except that it was noted that the vaginal desquamation in sheets occurred with fair regularity in the premenstrual phase, and during the period. The more detailed report will be given in a subsequent communication.

It may be stated, however, that no definite rhythm comparable to the cycle in

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be on and the rodent can be determined but it is a fact that as the menstrual period approaches, a more marked vaginal desquamation in the form of plaques takes place.

Deirck¹¹ and others have described in the vaginal mucosa a cyclic increase in the so-called functionalis with a desquamation of this layer just before and during the period. This would seem to be confirmed by the study of vaginal smears and menstrual blood. King,¹² in a careful study of normal women, states that there is a slight periodicity noted but not sufficient to lead to the conclusion that changes in the vaginal secretion serve as an index of periodic changes in the ovary or uterus.

A study of the white blood cells shows a striking finding. The number of polynuclear leucocytes varies tremendously. In the majority of the cases, they are fairly numerous in the vaginal menstrual blood, much more so than could be accounted for by the presence of the menstrual blood per se. In a preliminary study of the twenty cases where the leucocyte count of the circulating blood and of the menstrual blood as it escaped from the cervix, was undertaken, it was found that in all cases with a normal count in the peripheral blood, the white cell

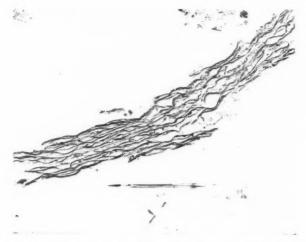


Fig. 8.—X 180. Large plaque of cornified epithelium; the origin of the compressed vaginal spindles is from these plaques.

count in the menstrual blood ranged from 1200 to 5200. In other words one or two things must have happened, either the white blood cells when they escape in the menstrual blood degenerate very rapidly or that the white blood cells do not leave the uterine blood space in the proportion that they are present in the circulating blood. Whether they leave the capillaries and remain in the tissues to perform some reparative function or whether they wander back into the blood stream, cannot at present be answered. It is also possible that because of their greater density they lag behind, adhering closely to the cervical wall and so do not appear in the streaming blood, or that they agglutinate to form small blood clots, the predominating constituent of these clots being the white blood cells.

To account, therefore, for the increase in the number of white blood cells found in the menstrual blood obtained in the vagina over that as it issues from the cervix, some other source of origin than the blood itself must be considered. It would seem most likely to account for this finding in the basis of an exudation through the vaginal mucosa (Fig. 9).

In some instances the number of polynuclear leucocytes was so great as to suggest histologically, pus. In practically all these cases inflammatory factors

TABLE I. SHOWING PERCENTAGE VARIATION IN THE OCCURRENCE OF UTERINE AND VAGINAL ELEMENTS ON SUCCESSIVE MENSTRUAL DAYS

	FIRST DAY	SECOND DAY	THIRD DAY	FOURTH DAY
Uterine epithelium	50%	74%	54%	4%
Uterine stroma	75%	90%	91%	50%
Vaginal spindles	95%	95%	82%	100%
Vaginal plaques	50%	72%	55%	25%

were present, either as pelvic exudates or diseased adnexa or cervices. On the other hand, in a number of cases, when inflammatory pelvic disease was diagnosed, the white cell content of the vaginal menstrual blood did not contain an excess of leucocytes. Just why there should be this variation at present cannot be determined.

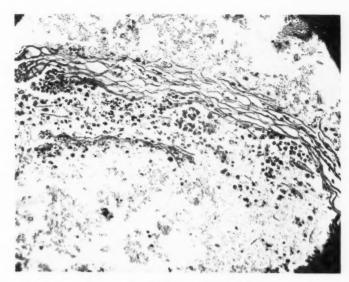


Fig. 9.—X 200. Vaginal plaque, infiltrated with polynuclear leucocytes showing the penetration of the mucous membrane by leucocytes, and the mechanism by which the leucocyte count in the vaginal blood is increased.

We find in the vaginal menstrual blood a definite number of elements which are sufficiently characteristic and stable to enable us to diagnose with certainty a menstrual blood from other types of genital bleeding.

To contrast with the above results we present here the findings of a study of 100 specimens of vaginal blood, presumably nonmenstrual in character.

The blood was obtained and prepared with exactly the same technic as used in the study of the menstrual blood. The same constituents were studied, namely, the uterine epithelium, both the glands and the stroma, the vaginal epithelium, and the leucocytes. It was striking that whereas in the series of bloods obtained from patients who were menstruating, the presence of either uterine stroma or glands were observed as high as 90 per cent on the first three days, in this series of 100 cases they were only found in fourteen instances. Uterine epithelium was found

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s to etors 4 times and stroma 10 times. In the 4 instances where epithelium was found, stroma was also present, so in reality in 10 cases only was glandular tissue and stroma either alone or in combination present.

If we examine the cases showing uterine epithelium in the vaginal blood we find that in one case the history suggested the possibility of an ectopic pregnancy, and an exploratory curettage done one day after the blood was obtained for examination, showed uterine mucosa typically that of a normal menstrual phase, In two other cases the bleeding that caused the patient to consult the physician, occurred approximately one month after a miscarriage and may properly be suspected to be a normal period. The fourth case was the first bleeding after a long period of x-ray amenorrhea, which may also be classed in all probability as a normal period. In those 6 cases in which only a stroma was found, one represented the eighth day of a period of bleeding that had started six weeks after the last regular period. The interpretation of this case must be left open. The second and third cases had a history of bleeding irregularly for two months. The blood obtained for examination might have been a menstrual exacerbation during a metrorrhagia. The fourth case was similar to the above two except here the bleeding was classed as functional and had persisted for a long time. In this instance also we might be justified in interpreting the discharge at the time of examination as a menstrual exacerbation. The other two instances were in cases that had been treated with x-ray to produce an amenorrhea and the blood was obtained at the first period after the amenorrhea. These two specimens could also be classed as probably menstrual bloods.

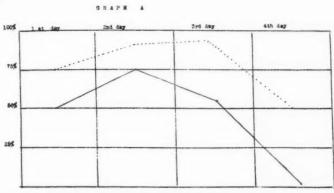
It will be seen that in those specimens where either stroma alone or in combination with uterine epithelium was found, we were in all probability dealing with menstrual blood. These results coincide very well with the previously mentioned results obtained in a study of normal menstrual blood.

In the remaining 90 cases the specimens were obtained from women with varying types of uterine fundal bleeding. None of the specimens as far as we could determine were menstrual in type. In this group were represented such conditions as incomplete abortions, metrorrhagia from fibroids, metrorrhagia with no demonstrable pelvic lesion, ectopic pregnancy, endometritis, diseased adnexa, etc. In other words, all types of gynecologic cases associated with fundal bleeding. In none of these 90 cases did histologic study of the hemorrhagic discharge show uterine epithelium or stroma.

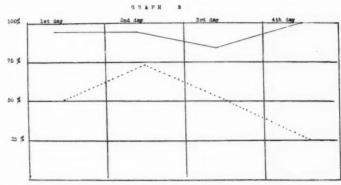
The finding of the vaginal epithelium either as isolated cells, the so-called spindles or in plaques was not common. In 19 cases plaques were found, mostly of small size and in 29 cases vaginal spindles were present. In every case where uterine epithelium or stroma was present, vaginal epithelium both as spindles and plaques were also found. As we have shown above these cases with uterine elements present were in all probability cases that were menstruating.

We have but 19 cases, as the ones showing uterine epithelium have already been discussed. Of these 19 cases, 9 had, vaginal plaques and spindles and 10 vaginal spindles only. In a number of these cases the vaginal spindles were few in number. This finding of a few isolated cells may have no bearing on a vaginal cycle. It is possible that normally in the vagina there is a constant slight desquamation of vaginal epithelium and that in these instances we were fortunate in our examination to find the cells in the specimens studied. Further, it is possible that because of the blood in the vagina a certain amount of maceration and desquamation takes place which we detect as vaginal spindles or even as plaques. Another possible explanation for the occurrence of vaginal spindles and plaques in these bleeding cases may be that the bleeding even though it represented a pathologic process yet took place during the premenstrual time and thus the vaginal epithelium

found represented the physiologic desquamation that presumably takes place at that time. On the other hand, it might be possible that some instances of bleeding with vaginal plaques present, represent a menstrual phase during a period of metrorrhagia, the menstrual process resembling that described by Corner as occurring at times in the Macacus and not associated with ovulation, uterine mucosal hypertrophy, and desquamation. Finally some of the specimens that contained vaginal epithelium were obtained from patients who had had incomplete abortions and in whom the lochia would naturally contain vaginal epithelium as a part of the reparative postpartum process.



Graph A.—Graph showing variation in occurrence of uterine mucosa in the menstrual blood. Dotted line represents stroma. Solid line represents epithelial elements.



Graph B.—Graph showing variation in occurrence of raginal mucosa in menstrual blood. Dotted line represents vaginal plaques. Solid line represents vaginal spindles,

The leucocyte count of the vaginal blood in these nonmenstrual cases showed a decided difference from the leucocyte count of the menstrual blood. The nonmenstrual cases showed the normal proportion of leucocytes in the blood as it issued from the cervix, except in a few cases where there was a marked increase in the number of polynuclear leucocytes. In these cases there was a coincident cervical disease. In two cases of diseased adnexa associated with cervical disease, there was a polynucleosis in the blood, as it escaped from the cervix and in the vaginal blood. The menstrual vaginal blood as has been pointed out, presents an increased polynuclear count due to transvaginal migration of leucocytes,

In fourteen cases of metrorrhagia not associated with fibroids and with no definite pelvic lesion, curettage was done either immediately after the blood was obtained

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or twenty-four hours later while the patient was still bleeding. In none of these cases was neerine elements found in the vaginal blood, and all the curettings showed byperplasias of the endometrium and cystic dilatation of the glands. There was no evidence of any desquamation, necrobiosis or other histologic sign of a menstruating uterus. Yet these patients were bleeding and bleeding profusely in many cases. We must conclude from this that in the type of case described, a metrorrhagia with no demonstrable pelvic lesion, the mechanism of the bleeding is different from that of the normal menstrual bleeding.

This study would indicate that the hemorrhagic vaginal discharge not due to menstruation, differs so decidedly in morphology from the menstrual blood that the two can be differentiated by histologic examination.

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(For discussion, see page 439.)

OBLITERATION OF THE VERMIFORM APPENDIX

A CLINICOPATHOLOGIC STUDY

By C. Alexander Hellwig, M.D., Wichita, Kansas (From the Pathological Laboratory of St. Francis Hospital)

A REVIEW of the surgical literature of the last fifteen years reveals that no study has been made of obliteration of the appendix. This is surprising, because atresia of the appendix is not a rare condition, and there is no unanimity of opinion in regard to its nature.

In his monograph on appendicitis, Royster (1927) comes to the conclusion that obliteration of the appendix may result from a chronic pathologic process or from physiologic atrophy. Aschoff, on the other hand, considers every obliteration of the appendix a sequel of acute appendicitis. The practical importance of the question whether the atresia of the appendix is a physiologic or pathologic condition, is obvious. The removal of an obliterated appendix will cure the patient, if it is due to inflammation; whereas no relief of the symptoms can be expected after appendectomy, if the atresia is a result of physiologic atrophy.

The object of this study was to determine which one of the two different views is better supported by anatomic and clinical facts. The material examined consisted of 60 obliterated appendices removed at St. Francis Hospital, between November, 1924 and October, 1928. During this period 859 appendectomies were performed.

Immediately after removal at operation the pathologic specimens were preserved in 10 per cent formalin, dehydrated in alcohol and embedded in paraffin. Sections were made from the distal, middle, and proximal thirds of the appendix. After noting gross appearance and microscopic features, the history, clinical and operative findings were abstracted.

Frequency.—Our 60 cases of atresia out of 859 appendices obtained at operation give a percentage of 7 per cent. This cannot be compared, of course, with the incidence of atresia as seen in autopsies (25 per cent). V. Redwitz found 6 per cent, Warren 6.5 per cent of the surgical appendices obliterated. The difference between autopsy and operative material is elucidated by the observations of Miloslavich and Namba who saw this condition in 30 per cent of the autopsy cases, but only in 7.5 per cent of the appendectomies.

All authors who studied the subject on autopsy material agree that the incidence increases with advancing age. This influence of age led Ribbert, Zuckerkandl, and Sudsucki to the conclusion that the atresia is a physiologic age involution. We agree with Senn that we must expect more cases of obliterations in old people, if we regard them as a sequel of inflammation because the longer the person lives, the greater the liability to suffer from acute appendicitis. Faber points out that the atresia of the appendix is like other sear formations which remain throughout life, once they are formed. Gruenfeld, for instance, found perigastric sears, following stomach ulcer, in 32 per cent of women older than sixty years, but nobody would conclude from these findings that stomach ulcer is more common in old age.

The following table shows the number of obliterated appendices as found in our series in the different decades of life:

AGE		NUMBER OF OBLITERATED APPENDICES		
1 - 10		2		
11 - 20		9		
21 - 30		24		
31 - 40	20			
41 - 50		2		
51 - 60		3		

Most of our patients with obliterated appendices (93.5 per cent) were younger than forty years. The average age of the 60 cases was 29.5 years, the youngest patient was four years old. This is surely not in favor of the view that obliteration of the appendix is due to age involution.

Gross Appearance.—Ribbert, Hansemann and Oppenheim point out that the obliteration, as a rule, is located in the tip of the appendix,

but that the acute appendicitis affects mostly the whole organ, and that therefore the atresia cannot be caused by inflammation. Also in our material the majority of obliterations (56 per cent) were limited to the distal third, but by examination of several hundred acutely inflamed appendices we observed that the acute appendicitis also starts, as a rule, in the distal portion and that in cases where the whole organ is affected, the most extensive destruction is found, almost without exception, in the tip. This explains why the distal third of the appendix is more liable to atresia than the proximal portions where often epithelial tissue remains viable after subsidence of the inflammatory process.

Miscroscopic Findings.—The main argument by which Zuckerkandl. Sudsucki, Oppenheim and others support their view that physiologic involution is the cause of atresia, is the uniform microscopic picture and the absence of inflammatory changes in the obliterated appendices obtained at autopsy. Our own microscopic findings did not harmonize with their descriptions and were far from being uniform.

Mucosa. In 22 per cent of our specimens which appeared solid to the unaided eye the microscopic examination revealed a narrow chink without epithelial lining (Fig. 1). In six cases this small lumen appeared empty, in two it was filled with leneocytes and round cells, in two others, fibroblasts with collagen fibers were growing from the wall into the lumen (Fig. 2).

In the other 47 cases no trace of a lumen was detected by microscopic examination. But one-third did not present the uniform picture as described by Ribbert either. In 9 the center consisted of cellular granulation tissue and in 6 cases it was infiltrated by numerous cosmophile leucocytes.

Lymphoid Tissue.—The amount of lymphoid tissue varied widely in our material. Forty-one specimens had well preserved lymphoid tissue in the center, six of them real lymph follicles with germinal center, which disproved Oppenheim's theory that the atrophy of the lymph follicles is the primary cause of the atretic process. The decisive factor for the varying amounts of lymphocytes in the solid center is the extension of the ulcerative process which led to the atresia of the appendix. The longer the obliteration persists, the more the lymphoid tissue will disappear, but we do not agree with Oberndorfer, that hyperplastic lymph follicles and lymph vessels filled with round cells are evidence of chronic inflammation. Both can be present as well in the normal appendix.

Submucosa,—The two layers of the submucosa are easily recognized, even in the obliterated appendix, as long as the lymphoid tissue of the inner layer is preserved. In this case the dense fibrous external layer with islands of fat tissue is very distinct. Sudsucki attempted to differentiate three forms of atresia, according to the varying amounts of fat tissue in the submucosa. Our findings do not confirm this view.

A scarcity of lymphocytes near the blood vessels in the external layer of the submucosa must not be regarded as sign of inflammation, as they are frequently found also in normal organs. A definite increase of cells was present in 25 of our specimens. We noted very many lymphocytes in 8, many lymphocytes in 9 and very cellular granulation tissue with fibroblasts, round cells and capillaries in 8 obliterated appendices.

Internal Muscle Layer. - In the normal appendix the inner muscle ring is not

sharply defined from the mucosa, little muscle bundles being separated by fibrous tissue. The spaces between the muscle tissue are normally very thin and harbor



Fig. 1.—Center of obliterated appendix. Scar tissue is replacing the former lumen and the mucosa. A very fine lumen is recognized by microscopic examination.



Fig. 2.—Distal third of appendix, four weeks after first attack of appendicitis. The mucosa is completely destroyed and fibroblasts with collagen fibers are filling in the lumen.

only occasionally eosinophile leucocytes and round cells. In 41 of our 60 obliterated appendices the inner muscle bundles were split in a marked degree which was

evidenced by comparing slides from the obliterated and patent portion of the same specimen. In 13 appendices the muscle bundles were separated by young granulation tissue with extensive cellular infiltration, in 19 by thick fibrous spaces and in 6 cases large scars interrupted the whole muscle ring and were regarded as residues of the intramural abscesses, according to the idea of Mundt and Aschoff.

External Muscle Layer.—In the normal appendix the longitudinal muscle layer often looks eccentric in the cross-section, one part of the circumference being thicker than the other. Near the insertion of the mesoappendix the muscle bundles are sometimes separated by fibrous spaces. Pathologic enlargement of the intermuscular spaces differs from the normal in that it involves mostly the whole circumference. This "segmentation" is regarded by Aschoff as a very reliable and sometimes the only remaining sign of a healed appendicitis (Fig. 3). It was present in 32 of our 60 cases. More recent inflammatory changes of this layer were

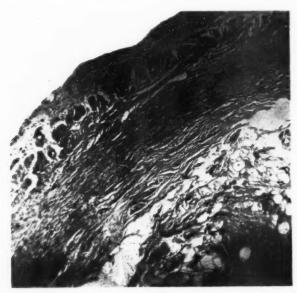


Fig. 3.—Thick fibrous spaces in the external muscle layer of an obliterated appendix. This "segmentation" together with thickening of the serosa by scar formation is often the only persistent sign of a healed appendicitis.

seen in 13 specimens, in two appendices follicle-like groups of round cells had formed between the muscle bundles.

Serous Layer.—The serosa of the normal appendix is a very thin layer of loose connective tissue, covered with the peritoneal endothelium. Often fat tissue is noticed in the serosa, opposite the insertion of the mesoappendix. Following a phlegmonous appendicitis the thickening of the serosa by scar tissue recedes slowly, but may remain as a persistent sign of a healed inflammation. In 45 of the 60 obliterated specimens the serosa was much thicker than normal and only 8 were without cellular infiltration. In 37 the cellular infiltration was abundant and consisted of neutrophile and eosinophile leucocytes (16 cases) or small round cells (21 cases). The latter were grouped, as a rule, around blood vessels and formed in 5 specimens larger groups resembling lymph follicles. We agree with Nishikawa that a new formation of lymphoid tissue in the external layers of the appendix is a valuable sign of healed inflammation.

The Nonoccluded Portion.—In the 33 specimens with partial atresia the sections of the patent portions furnished most interesting data. More than two-thirds

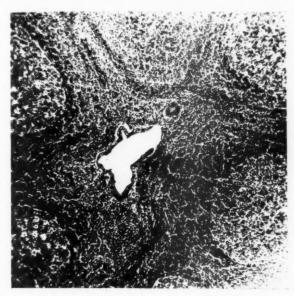


Fig. 4.—Stenosis of the lumen and incomplete repair of the epithelium in the proximal portion of a partially obliterated appendix. The hyperplasia of the lymph follicles is no sign of inflammation.



Fig. 5.—Patent portion of a partially obliterated appendix. The epithelial and lymphoid tissue is completely destroyed and replaced by granulation tissue. Acute attack five weeks previous to the operation.

showed pathologic changes. Twelve had a marked stenosis and distortion of the lumen, with low epithelium and few or no glands (Fig. 4). In 8 other appendices

the epithelial tissue was completely missing and cellular granulation tissue surrounded the lumen (Fig. 5). If the process would go unchecked in these cases, obliteration of the entire lumen would be the terminal stage. In three specimens we found a typical primary focus in the mucosa of the patent portion (Fig. 6). A condition which Aschoff described recently as rudimentary appendicitis was observed in 4 appendices, where leucocytes infiltrated the wall, especially the muscle layers, but the portal of entrance could not be detected.

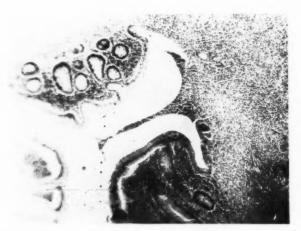


Fig. 6.—Primary focus in one recessus of the patent portion. The last of several attacks occurred three days before the operation.

CLINICAL DATA

In our cases the following clinical diagnoses were made:

Appendicitis	
neute	12
subacute	7
chronic	8
recurrent	19
Total	46
Other Abdominal Disease	s
Duodenal ulcer	1
Cholecystitis	7
Salpingitis	7
Retroflexion	3
Prolapse of uterus	1
Total .	14

In the second group six cases are included in which a diagnosis of appendicitis, complicated by some other intraabdominal disease was made. Forty-eight of all our patients with obliterated appendices had definite acute attacks of pain, months or years prior to the operation, which were interpreted as acute appendicitis. In the history of the other 12 cases severe attacks were not mentioned, but only slight recurrent discomfort, indigestion, backache, painful menstruation were

complained of, or the patients were entirely unaware of a serious abdominal disorder.

Acute Appendicitis .- Eight of the 12 patients with clinical diagnosis of acute appendicitis complained of several definite attacks previous to the operation. If we consider leucocytic infiltration of the wall as evidence of acute appendicitis, then the pathologic findings did not harmonize with the clinical diagnosis in onehalf of these 12 cases. In two specimens the leucocytes were numerous only in the external layers of the completely obliterated appendix, and we are inclined to believe that this periappendicitis was secondary to some other intraabdominal inflammation, in spite of the fact that the operation did not reveal it. Five appendices which belong to this group were completely obliterated and did not show any leucocytic infiltration. It raises the question whether the symptoms which led to the clinical diagnosis of acute appendicitis were due to some other pathology of the appendix or whether they were caused by pathology of some other organ. At least in one of these cases which had a leucocyte count of 18,000, the completely occluded appendix could not account for the severe attack. V. Redwitz found in all obliterated appendices of his series endarteritis of the appendiceal blood vessels and expresses the belief that a spasm of the diseased vessels could produce severe attacks of pain. Since only one of 5 cases with clinical diagnosis, but without pathologic evidence of acute appendicitis, presented these endarteritic changes, we do not feel justified in accepting his explanation. Also Rohdenburg's view that the painful attacks are due to compression of ganglion cells by scarring in the obliterated appendix seems questionable, because no other part of the body is known where fibrosis produces acute attacks of pain.

The problem of visceral sensibility is far from being solved. The opinions are still divided whether the sympathetic fibers of the intestinal wall are able to transmit painful stimuli or whether only the cerebrospinal nerves of the lateral peritoneum are responsible for abdominal pain. We agree with Goldscheider, Mueller, and others that the visceral pain can originate in the intestine itself. The work of H. Braun and Schade seems to demonstrate that it is not so much the mechanical, but the physicochemical irritation of the sympathetic nerves by the inflammatory exudate which causes the pain in inflammation. This of course will not be the case in completely occluded appendices, except where acute inflammation spreads from some other intraabdominal organ to the external layers of the wall, as is often seen in salpingitis. We shall understand further that the healing stage of acute appendicitis can also be acompanied by pain, if we keep in mind that healing wounds of the skin are often hypersensitive to the slightest touch. The passage of fecal material or muscular contraction of the organ accounts in all probability for the discomfort in the recovering stage of appendicitis.

Subacute Appendicitis,—This was diagnosed by the clinician in 7 cases. In two of these, cramp-like pains were present for several years, often at times of menstruation. Two patients complained of mild attacks of pain, two and three weeks respectively before the operation, and did not remember any former attacks which could account for the complete atresia of their appendices. In this group was also a four-year-old boy who took sick suddenly five weeks prior to the operation. The whole mucosa of the appendix was destroyed and replaced by cellular granulation tissue. Four other cases showed microscopic evidence of a recent inflammation.

Recurrent Appendicitis.—Senn who introduced the term "Appendicitis obliterans" pointed out that the most constant symptoms which attend this form are recurrent acute exacerbations of short duration and persistence of soreness and tenderness in the region of the appendix during intermissions. All but two of our 19 patients in this group had such a history of repeated typical attacks of severe character. Six patients had total atresia of the appendix and in more than % only the distal third was occluded. The appendix of one patient who had the last of several attacks

two days before the operation showed in the patent portion a typical primary focus in the mucosa and some leucocytic infiltration of the wall. In three other partially obliterated specimens part of the mucosa was replaced by cellular granulation tissue and many cosinophile leucocytes were present in the wall. Leucocytic infiltration was not found in two specimens in spite of the fact that the last attacks occurred one and two weeks respectively previous to the appendectomy.

Chronic Appendicitis .- An exhaustive inquiry into the nature of chronic appendicitis is not within the scope of this paper. After reviewing over 100 microscopic sections of so-called chronic appendicitis, I agree with Aschoff that morphologic evidence of chronic appendicitis proper does not exist. In the cases where the appendix is diseased either repeated mild acute inflammations or the healing stage of acute appendicitis are the pathologic bases of so-called chronic appendicitis. On the other hand, I believe that the tendency of modern writers to abolish entirely the clinical diagnosis "chronic appendicitis" is too radical. It must be kept in mind that even purulent appendicitis can occur without severe clinical symptoms and the convalescent stage of an acute attack can last several months. With such a conception a lingering course of appendicitis without acute symptoms is readily conceivable, and for these cases the term "chronic" seems as much justified as in chronic tonsillitis, salpingitis, or osteomyelitis. We must admit, however, that very often the clinical diagnosis of chronic appendicitis cannot be confirmed by any pathologic findings in the appendix. In my study of over 100 cases, diagnosed clinically as chronic appendicitis, only 51 per cent of the specimens showed inflammatory changes and in a large clinical material Melchior found only 40 per cent of his patients relieved by appendectomy.

Of our occluded appendices there were S obtained from patients with so-called chronic appendicitis. Five in this class had several acute attacks and their histories did not differ in any sense from those with recurrent appendicitis. In two the painful attacks occurred at the time of menstruation, one patient complained of stomach trouble which had no relation to meals. Three appendices were completely occluded, five only in the distal third. In two specimens no recent inflammatory changes were found, one showed only marked endarteritis in the subserosa and submucosa. A typical primary focus with leucocytic infiltration in the patent portion was revealed in one case in which the last of several attacks occurred three days previous to the operation. In one other case the presence of cellular granulation tissue with many cosinophile leucocytes in the wall conformed to the history of his last attack one week before the operation. Two appendices in this group showed extensive perivascular infiltration of lymphocytes in the serosa.

Other Abdominal Diseases.—In the case complicated by duodenal ulcer the obliterated appendix had granulation tissue in the mucosa and submucosa and many cosinophile leucocytes were infiltrating the whole wall. Four appendices were obtained in the course of operation for cholecystitis. In one of these, cellular granulation tissue replaced one-half of the mucosa in the patent portion and the other layers of the wall were infiltrated by numerous leucocytes. One appendix showed extensive infiltration of the subserosa by cosinophile leucocytes in addition to large groups of small round cells.

The difficulty of differentiating clinically between acute appendicitis and salpingitis is well known, as inflammation of one of the two organs can spread to the other. Coexistence of a healed appendicitis and of salpingitis is no argument for considering salpingitis as a sequel to appendicitis. In primary appendicitis it may be expected that only the external layers of the tube are involved and that the mucosa is without inflammatory changes. On the other hand, gonorrheal salpingitis will cause as a rule only infiltration of the subserosa of the appendix without affecting the inner layers. In three of our seven cases which were diagnosed as salpingitis, the microscopic examination suggested only a secondary involvement of the tube following appendicitis.

Four of our obliterated appendices were obtained at operations for retroflexion and prolapse. One of the patients complained of pulling sensations, another of stomach trouble, the third of pain in both sides and the fourth felt discomfort only when standing. Except for round-cell infiltration of the subserosa in one specimen, no inflammatory changes were found in this group. It raises the question whether the discomfort of these patients was due to the misplaced uterus or to recurrent mild attacks of appendicitis which resulted in atresia of the appendix.

SUMMARY

Of 859 appendices obtained at operation 60 or 7 per cent showed, atresia of the lumen. In 56 per cent only the distal third was occluded, in the others the whole organ.

The microscopic picture of the obliterated appendices did not correspond to the descriptions as given by Ribbert, Sudsucki and Oppenheim who studied autopsy material. Far from being uniform, it was of the greatest variety. In more than one-half of the cases leucocytic infiltration and cellular granulation tissue was found which indicated that an inflammatory process had not completely subsided or that a healing stage of acute appendicitis was complicated by recurrence. Signs of a healed appendicitis were found in about $\frac{2}{3}$ of the specimens and consisted of scar formation in the external layers. The histologic examination of the nonoccluded portion revealed pathologic changes in $\frac{2}{3}$ of the partially obliterated appendices and in one-half of these the inflammatory changes were recent.

No morphologic evidence of chronic appendicitis proper was found in our material, but all stages of transition from acute purulent inflammation to the healing stage and to terminal fibrosis were present, leading to the conclusion that the atresia is the final stage of ulcerative appendicitis in which the epithelial tissue is completely destroyed.

The average age of our patients was twenty-nine and five-tenths years, the youngest being four years old. Forty-eight patients (79 per cent) complained of recurrent acute attacks which were interpreted as attacks of appendicitis. In 12 the clinical history was not typical. The clinician's diagnosis was in 46 cases, appendicitis alone; in 6, appendicitis complicated by some other intraabdominal disease; in 8 patients a lesion of the appendix was not expected.

CONCLUSIONS

The clinical as well as the morphologic data in our series are in harmony with the view held by Aschoff that atresia of the appendix is due to acute appendicitis.

An appendix with complete obliteration will not undergo inflammation again and its removal will not relieve the patient of his symptoms. An appendix with partial obliteration, on the contrary, is disposed to recurrent inflammation, because the stenosis of the nonoccluded portion and the fibrosis of the muscle layers favor retention of its contents and bacterial invasion of the mucosa.

1017 N. St. FRANCIS AVENUE.

CASE OF GRAVID UTERUS DIDELPHYS RESULTING IN STREPTOCOCCIC PERITONITIS*

By H. J. Epstein, M.D., and S. A. Goldberg, Ph.D., New York City (From the Obstetric Service of the Bronx Hospital)

THE medical literature is replete with articles on this subject, and almost every textbook on obstetrics describes the various forms of the double uterus, as the uterus septus, bicornis, didelphys, etc., yet very little is written about the pathologic conditions resulting during



Fig. 1.—Normal attitude of fetus in a normal uterus.

pregnancy in such women. The following case report is therefore of interest:

Mrs. M. K., aged twenty-five, primipara. In her fifth month of pregnancy, was examined in the prenatal clinic, and found to have a double uterus. The vagina was divided in two parts by a septum, and in each part a cervix was seen. By palpation a uterus bicornis was mapped out, the right uterus being impregnated. Her pelvic measurements as well as her general condition were normal.

^{*}Read before the North Bronx Medical Society,

On March 9, 1928, then six and one-half months pregnant, she suddenly developed severe pain in the right lower abdominal region, with chills and vomiting. Her temperature was 104° F. The pain becoming progressively worse, she was taken to the hospital.

Physical examination revealed an acutely ill female adult, with marked tenderness over the right lower abdomen. The right cervix was open, admitting one tinger and bleeding, with membranes intact. The left cervix was closed. The fetal heart rate was 180 per minute.

Previous history negative. Menstruation began at the age of fourteen, regular thirty day type, lasting four to six days; she always suffered with premenstrual



Fig. 2.—Deviation of fetus to right in uterus didelphys.

pain. Her last period was Aug. 29, 1927; patient now six and one-half months pregnant, para i, no miscarriages. Abdominal examination showed the fundus uteri enlarged, palpable above the umbilicus. Rigidity, pain, and rebound tenderness were localized over the right lower quadrant. There were no intermittent uterine contractions, probably because the patient had received morphine before admission to the hospital. A blood count showed Hb. 70 per cent; leucocytes, 24,000; neutrophiles, 93 per cent; and lymphocytes, 7 per cent.

Provisional diagnosis of acute appendicitis was made; and exploratory laparotomy decided upon.

On opening the abdomen, a thin, yellowish, odorless fluid was noticed. The appendix was normal, but the right ovary was found very much enlarged, inflamed, and appeared necrotic. A rubber tube drain was inserted, and abdomen closed

The blood culture as well as the culture of the abdominal fluid showed Streptococcus hemolyticus in eighteen hours; colonies per c.c. of blood too numerous to count.

Postoperative diagnosis: General peritonitis with Streptococcie (hemolyticus) bacteremia.

On March 10, at 5:00 a.m., a premature stillborn male child was delivered spontaneously. The placenta though delivered from uterus spontaneously, had to be removed from vagina manually. The patient died March 13, 1928.

AUTOPSY FINDINGS

(Positive Findings Only)

The abdomen was distended with greyish cloudy liquid. The uterus was enlarged and divided by a septum into two unequal parts. The right 15 by 7 by 5 cm.,

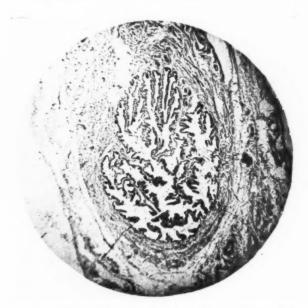


Fig. 3.-Left tube showing normal villi and normal wall.

with the cervix 3 cm. in diameter; the left 11 by 5 by 5 cm., with the cervix 2 cm. in diameter. The peritoneal surface was smooth, the wall thick and soft, 1.4 cm. thick; the septum was 1.2 cm. thick, soft and in places necrotic. The lumina were filled with necrotic material.

The right ovary measured 5 by 4 by 2 cm., greyish, soft, necrotic and covered by fibrinopurulent exudate. The right tube and fimbria were thicker than the left. The left ovary measured 3 by 3 by 1.5 cm., and the tube appeared normal. The broad ligaments appeared normal on both sides.

Histologic examination showed in the right ovary coagulation necrosis with a demarcating zone of polymorphonuclear leucocytes with fibroblasts, and endothelial cells. The rest of the ovary contained hemorrhage and congested vessels. The left ovary showed neutrophilic infiltration near the surface and slight congestion of the vessels. The right tube presented in the subserosa perivascular infiltration of endothelial leucocytes, lymphocytes, and few neutrophiles, with capillary congestion. The muscularis was similarly affected, and in addition showed edema. The

mucosa showed the villi thickened by infiltration of endothelial leucocytes, lymphocytes, and neutrophiles. In the left tube there was infiltration of polymorphonuclear leucocytes in the perivascular spaces and in the tips of the villi. In the uterus the endometrium showed coagulation necrosis, and polymorphonuclear leucocytes. Many of the vessels were thrombosed, and there were areas of hemorrhage. The muscle coats in the myometrium were separated by edematous fibrous tissue, with perivascular infiltration of endothelial leucocytes, lymphocytes and neutrophiles. The muscle fibers were degenerated. The septum was more affected than the rest of the myometrium. The condition of the endometrium was the same in both uterine cavities each containing sloughing decidua.

Analysis of the Pathologic Findings: The right ovary shows gangrenous ophoritis of some duration, produced possibly by disturbed circulation, together with infection, as evidenced by the size of the organ, the engorged vessels, and hemorrhage, suggesting torsion or massive embolism.



Fig. 4.—Enlarged right tube showing villi thickened by purulent infiltration.

The diffuse peritonitis very likely originated in the right ovary, since the uterine serosa was free from exudate. On the other hand, the histologic picture of the uterus is that of a septic endometritis, with perivascular infiltration of endothelial leucocytes in the myometrium, indicating an inflammation of longer duration. This indicates a possibility also, that the peritoneum was infected through the ostium of the right tube.

The immediate fatal issue was very likely the result of Streptococcus hemolyticus bacteremia,

DISCUSSION

The prerequisites of a normal generative process are healthy, normally developed genitalia. Developmental anomalies of the female genitalia are often obstacles to conception, and when conception does occur, the development of the fetus is frequently interfered with.

Finally, when the pregnancy comes to term such anomalies may become causes of serious dystocia, endangering not only the life of the child, but also that of the mother.*

The developmental anomaly of a double uterus, due to the failure of fusion of the müllerian duets, is often encountered. The uterus didelphys, bicornis, bilocularis, septus, etc., all depending upon the degree of fusion of the müllerian duets. This leaves the organs of generation in an imperfect state, constituting a most vital problem for the obstetrician.

The appendages of a double uterus are most always in a state of chronic inflammation, and during pregnancy, it constitutes a most inviting place for bacterial invasion. The abnormal position of the child in such a uterus, as we can see from the x-ray (Fig. 2), is often a cause of fetal asphyxia, even before labor sets in; and the deviation of the upper pole of the fetus to one side prevents the lower pole from engaging during labor in a normal position.

Pregnancy in such uteri occurs; even twin pregnancies, one fetus in each cavity of the uterus, were observed. Sometimes such cases go through pregnancy and birth uneventfully. This is the exception; as a rule the birth is interfered with. A retained placenta with severe postpartum hemorrhage is a common occurrence in such uteri. This is due to the lack of decussating muscular fibers from one half of the uterus to the other, the side forming the median line being weaker in structure. The contractile power of such a uterus is not sufficient to expel the placenta, or to obliterate the bleeding sinuses and blood vessels.

Septic emboli are also seen in such uteri. This may be explained by the two uterine arteries not anastomosing as they do in front of and behind a single cervix, behaving similarly to a terminal circulation. Prof. Strassman of Berlin considers these uteri when they become pregnant with the same apprehension as ectopic pregnancy. He advocates an operative procedure before permitting pregnancy, uniting the two halves and forming one uterine cavity; and when pregnancy is discovered early, he empties the uterus artificially, and then performs this plastic operation. In cases of uterus septus, all that is necessary is to cut through the septum.

In our case the necrotic right ovary may have been caused by a septic thrombus in the right uterine artery cutting off the blood supply of the ovary, the blood supply of the latter being mainly by the ramus ovarious, a branch of the uterine artery.

It also gives us a clear view of the condition of the appendages of the uterus as seen from the microscopic slides. The right pregnant side presents an inflamed condition, whereas the nonpregnant side appears to be normal.

^{*}Falls, F. H.: Am. J. Obst. & Gynec, 15: 399, 1928,

A mucous plug is still noticeable in the left cervical canal. The general septic condition may have started within the right uterine cavity, entering the blood stream through the veins and lymphatics.

CONCLUSIONS

- 1. Treat pregnancy in a double uterus as a nonruptured ectopic; empty the uterus and correct the maldeveloped organ.
- If the condition was not discovered until the end of pregnancy a course of watchful waiting must be assumed. Sometimes an uneventful delivery will take place.
- Be prepared for a severe postpartum hemorrhage, and be ready for a stormy puerperium.

THE CLINICAL USE OF VAGINAL SPREADS

By Max D. Mayer, M.D., New York City (From the Gynecelogical Service of Mount Sinai Hospital)

AN EXTREMELY interesting and careful study of the vaginal flora, made under the direction of Schroeder, has thrown light upon the biology of the vagina. The study included a combined bacteriologic, chemical, and microscopic investigation.

The following brief report represents an attempt to apply the examination of vaginal smears as a routine procedure, and to determine its diagnostic value in gynecologic cases.

Schroeder, R. Heinrichs, and R. Kessler have gone far beyond the early investigations of Doederlein, Menge, von Jaschke, and others. They have demonstrated the concomitant variation between the hydrogen-ion determination of vaginal secretions and the degree of bacteriologic cleanliness, as well as the morphology of the smears. They have shown that the recognition of the Doederlein bacillus by smear is substantiated by careful plating. From this it appears, therefore, that in a practical method of utilizing the knowledge of a particular vaginal flora in a series of cases, it is unnecessary to use cultural methods or titration.

My study is based upon 600 cases, in each of which smears were taken from within the introitus, the midvagina, the anterior fornix, and the cervix. In each instance a careful history and an examination were included as part of the procedure. Cases in which the diagnosis could not be substantiated by operation or otherwise were not included. The smears were stained by the Gram method. Schroeder in his own routine cases now uses methylene blue. I have not found this sufficient. The smears were examined and described without knowledge, at the time, of clinical data. The patients in the reported series were on the

gynecologic ward in Mount Sinai Hospital; a large number were similarly studied in the Out-Patient Department and in private practice. The series was divided into two groups: (1) a preliminary study of (a) the variations in findings in varying portions of the vaginal tract; (b) the consistency of the findings in the same patient; (c) the proper classification of smears for diagnostic purposes, etc., and (2) the series reported below.

The preliminary study of 300 cases seemed to warrant the division into the following types:

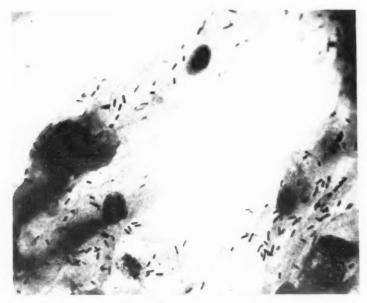


Fig. 1.—Intact virgin Flora 1 moderate number of Doederlein bacilli, some desquamated epithelial cells. This slide is characteristic of a clean, nongravid vagina.

- 1. Flora 1.—Doederlein bacilli only, epithelial cells, with or without some pus.
- 2. Flora 2a.—Doederlein bacilli as well as other bacteria without frank pus.
- 3. Flora 2b .- Doederlein bacilli, other bacteria, with pus.
- 4. Flora 3a.—No Doederlein bacilli present. Bacteria of a single type, or a variegated flora, no pus.
- 5. Flora 3b.—No Doederlein bacilli present. Bacteria of a single type or a variegated flora, with pus.
 - 6. No bacteria present, débris only. .

Flora 1 connotes discharge that is white, but a white discharge does not always signify Flora 1. The correlation between the findings in various portions of the vagina was high. Repeated examinations of any individual showed a high degree of consistency. Coitus even if it had occurred recently seemed to play no appreciable rôle. If other bacteria than Doederlein bacilli were found in any portion of the tract, the smear was not classified as Flora 1; and if Doederlein bacilli were seen in any portion, the smear was classified as Flora 2. The cervical

smears were of importance in the diagnosis of gonorrhea as well as in the evaluation of the upper vaginal smears.

A series of 300 cases was then studied, utilizing the method as a diagnostic aid. Of these, 80 cases had to be excluded because of diagnostic doubt or unsatisfactory smears. An analysis of the remaining cases follows:

Flora 1 was found most often in virgins, in pregnant women, and in uncomplicated menopause cases. In pregnant women, the slides very frequently showed a characteristic luxuriant growth of large, plump Doederlein bacilli, together with large desquamated epithelial cells, nucleated and nonnucleated. The more children a woman had previously borne, the more certainly the presence of Flora 1 signified



Fig. 2.—Flora 1 luxuriant growth of Doederlein bacilli, desquamated cells. Smear from a pregnancy in a multipara.

gravidity. With repeated pregnancies one may expect to find a more and more contaminated vagina. It is obvious, then, that Flora 1 will have a greater diagnostic value the larger the number of previous births. In intact virgins Flora 1 was invariable.

Flora 2 and 3a without pus were most frequently found in noninfected non-gravid women, most of whom came to the ward for plastic operations or fibromyomas; the characteristic finding in cystorectoceles may be due to exposure and contamination through a lax introitus. Cervical carcinoma showed either Flora 3b together with a varying number of monocytes, or débris without bacteria. The number of women with ectopic pregnancies examined, was insufficient to warrant the drawing of conclusions. Bleeding usually interfered with the examination even when a special technic was employed, involving the use of acetic acid. The results therefore disappointed any of the hope entertained of an additional aid in this so frequently troublesome diagnosis.



Fig. 3.—Flora 2a epithelium, practically no pus, some débris, a moderate number of Doederlein bacilli, a few other bacteria; a relatively clean vagina.

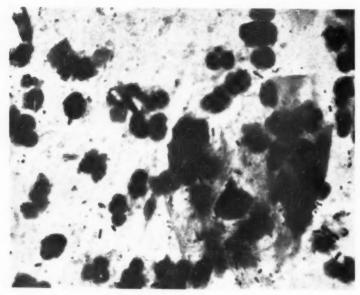


Fig. 4.—Flora 2b many pus cells, a few Doederlein bacilli, many other bacilli. This woman came into the hospital for cystorectocele. The had had three children, three curettages; had been married fourteen years and was separated for three years. It represents an intermediate slide between Flora 2a and Flora 2b,

Of the 220 cases, 201 were compatible with the preliminary impressions. In 19 cases the results were potentially misleading although there was no actual difficulty in establishing a clinical diagnosis in any of these cases. In 19 other cases the smear proved a distinct diagnostic aid. The diagnostic value was greatest in the following instances:

Gravidity vs. fibroid or cyst Gravidity in very obese patients Salpingitis vs. appendicitis Diseased adnexa vs. neoplasm Intact virgin? Clean vs. infected abortion

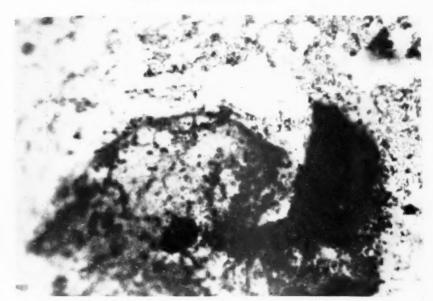


Fig. 5.—Flora 3a innumerable bacteria, gram-positive and gram-negative; no pus.

This type of smear was frequently found in noninfected cases.

No case of gravidity was encountered in which Doederlein bacilli were not found, even including 3 cases of genorrhea complicating pregnancy. (Since the completion of this series, I have seen one case of gravidity with absent Doederlein bacilli. This patient had a marked vaginitis.)

There were 26 fibroids:

Flora 1		0
Flora 2a without pus		10
Flora 2b with pus Flora 3 without pus	,	9
Flora 3 with pus (of these, three obviously also inflammatory)	were	4
Total	· !	26

There were 33 plastics:

Flora 1 (past menopause)	1
Flora 2a without pus	20
Flora 2b with pus	2
Flora 3 without pus	8
Total	31
Flora 3 with pus (of these, both had complete prolapses and protruding cervices)	2
Total	33

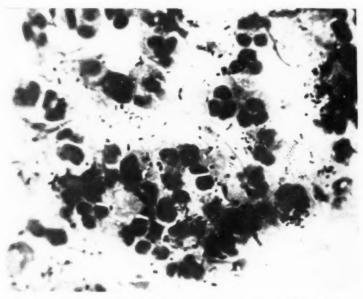


Fig. 6.—Flora 3b with pus, intra- and extracellular, gram-positive and gram-negative bacteria; no Doederlein bacilli.

There were 11 carcinomas of the cervix:

Flora 1		0
Flora 2		()
Flora 3 with pus		
Débris, no bacter	ia	6
		-
Total	•	11

There were 25 cases of diseased adnexa:

Flora	1		0
		without pus	5
		with pus	4
Flora	3	without pus	4
Flora	3	with pus	12
			-
Total			95

There were 3 cases of tuberculous adnexitis:

Flora 1 (1 virgin) (1 nullipara)	0
Flora 3 with pus (this case also had a	
tuboovarian abscess)	1
	_
Total	3

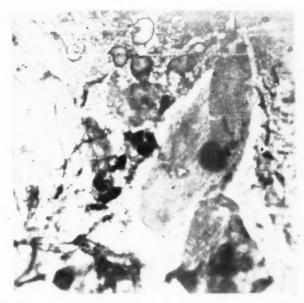


Fig. 7.—Epithelial cells, occasional pus cell, débris, blood, no bacteria; a case of carcinoma of the cervix that had been treated by radium.

There were 12 cases of incomplete abortion:

Flora	1		2
Flora	20	without pus	;}
Flora	2b	with pus	13
Flora	3	without pus	9
Flora	3	with pus	3
			-
Total			12

CONCLUSIONS

A routine examination of vaginal smears correlated with the history is of some value in gynecologic diagnosis. The method is most useful in a differential diagnosis of gravidity, salpingitis vs. appendicitis, and diseased adnexa vs. neoplasm. The principal fact in the history to be taken into account is the number of births. The test is suggestive but in no sense pathognomonic.

INTRAABDOMINAL REEFING OF THE PUBOCERVICAL FASCIA (MODIFIED POLK OPERATION) FOR THE CURE OF CYSTOCELE*

By Robert T. Frank, A.M., M.D., F.A.C.S., New York, N. Y. (From the Gynecological Service of Mount Sinai Hospital)

DURING the last few years I have encountered a series of operative cases which caused me much thought and reflection. The first of these cases was a patient on whom an abdominal hysterectomy for fibroids had been performed by another operator, and in whom a complete evagination of the cervical stump and vaginal walls had taken place, which recurred again and again in spite of repeated operations. In another patient with cystocele, rectocele, and a large fibroid, I had performed an abdominal hysterectomy and ventrofixed the cervical stump to avoid such prolapse and eversion of the vagina. Although the stump remained fixed well up in the abdominal wall, a huge increase of the cystocele was soon noted. An attempt to cure the bladder prolapse by means of an anterior colporrhaphy from below was difficult and only partially successful.

In 1927 I was again confronted with a patient who harbored a large fibroma of the uterus and at the same time suffered from cystocele and rectocele. Preoperative examination showed that the vaginal walls were relaxed and that the cervix was movable. It thus became apparent that after hysterectomy the entire vault, including the cervical stump, would prolapse unless special measures to prevent this were taken. I therefore performed an abdominal supravaginal hysterectomy and double salpingo-oophorectomy, leaving as large an intraabdominal cervical stump as was feasible. After completion of this stage of the operation, I brought together the anterior vaginal planes beneath the bladder, by modification of the technic described by William Mecklinburg Polk in 1912, as part of an operation for prolapse. Having done this, I implanted the stump of the cervix, not covered with peritoneum, into the abdominal wall, according to the technic to be presently described. The result was excellent. Since then I have had the opportunity of using this same technic seven times under identical conditions.

In 1912 William Mecklinburg Polk of New York City, described an operation for procidentia uteri which, in the main, consisted in opening the abdomen suprapubically and shortening the sacrouterine and cardinal ligaments by means of a complicated suture passed

^{*}Received for publication, June 1, 1929.

through the broad ligament. Neither the illustration nor the description of this suture has made its application understandable to me.

The portion of the operation that interests me and which I have repeatedly practiced with some modification, is the reefing and bringing together of the pubocervical fascia from within the abdomen. In the words of Dr. Polk:

"The peritoneal covering is now slit from the uterus to the bladder, the vagina being held taut upward. Through this opening (it may be enlarged by lateral incisions if necessary) the bladder is separated from the entire anterior face of the vagina as far as the urethra in extreme cases. This separation is made best with the gloved finger covered with gauze, or with gauze in a sponge holder, the grip of the gauze displacing the tissue with the least risk of injury to important structures. In this separation if one keeps to the vaginal wall, which is recognizable by its smooth and yellowish white structure, the ureters are pushed up and away from this canal, especially opposite the line which the first plicating suture must transfix. This line is as far down as possible upon the anterior surface of the vagina (about opposite the trigone). Seize the side of the vagina with a bullet forceps, taking a generous bite, draw it up and pass the suture from without in, repeat this on the opposite side from within out. In this fashion the vagina is plicated from below upward. The number of sutures required depends on the length of the vagina, rarely more than 4 are necessary; the arteries and veins are tied when necessary. Hemorrhage is rarely a troublesome feature and always easily controlled; rents in the cavity of the bladder are easily corrected, but need not occur."

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Dr. Polk complicated his operation by tying the broad ligament sutures referred to previously and trusting to the insecure elevation produced, by plication, of the round ligaments, to hold up the uterus. He then excised or shortened the ridge resulting within the vagina by a small operative procedure from below. He reported 17 cases operated by this technic. This operative procedure has never become popular. One step, however, is of value.

Of the entire technic utilized by Polk, I have adopted in a modified form only that portion which applies to the reefing of the pubocervical fascia in the abdomen.

TECHNIC OF THE OPERATION

1. Combined With Hysterectomy.—In those cases in which large fibroids of the uterus exist coincidentally with cystocele and rectocele, the following technic has been used. Paramedian, suprapubic, transrectus incision; typical supravaginal hysterectomy, usually with bilateral salpingo-oophorectomy. In one case the adnexa of one side were retained. In amputating the uterus the stump must be left sufficiently long to permit of its ready fixation in the abdominal wall. This is tested by pulling the entire mass into the lower angle of the wound before the transverse section is performed.

The cervical or uterocervical stump is thoroughly cored out, so as to permit good approximation of the interior of the cervix, by means of several interrupted sutures. (See Fig. 1.) Careful tying of the uterine vessels and closure of the outer portions of the broad ligament with interrupted sutures is indicated because, as will be

seen hereafter, an unusual strain is put on the peritoneal covering of the pelvis. The cervical stump is pulled upward (cephalad) so as to tense the anterior structures.

The bladder is now gently freed downward toward the urethra and separated from the vagina, keeping strictly in the median line until the region of the

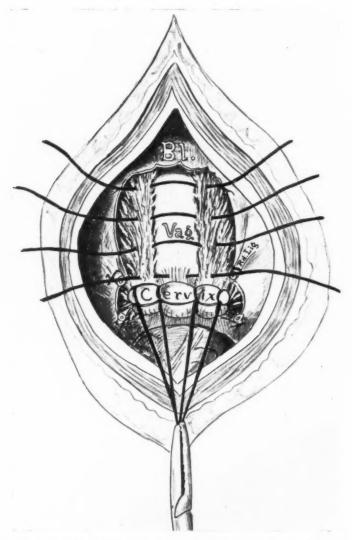


Fig. 1.—The cervical stump, after hysterectomy, is shown pulled cephalad. The bladder has been freed from the vagina. Four chromic sutures have been passed through the pubocervical fascia.

trigonum has been passed. The beginner with this operation can have an assistant pass a finger into the vagina from below in order that the distance from the introitus can be accurately gauged. It is important to separate vagina and bladder as delicately and bloodlessly as possible and this is best performed by first freeing in the median line. After this area has been liberated the bladder

may be separated laterally for one and one-half inches from the median line, care being taken not to injure the more or less developed, thin veins found in this region. A long, narrow retractor, wrapped with a few layers of gauze, is introduced to elevate the bladder toward the symphysis at the lower wound angle. The vaginal and cervical fascial planes are now readily visible if the patient is in steep Trendelenburg posture. Starting below the region of the trigonum a transverse suture is passed, taking in the pubocervical fascia on the patient's right side and crossing over the vagina and taking the left pubocervical fascial strands. Two other sutures are passed above the first one. The fourth suture includes the cervix of the uterus, approximately where the supravaginal and infravaginal por-

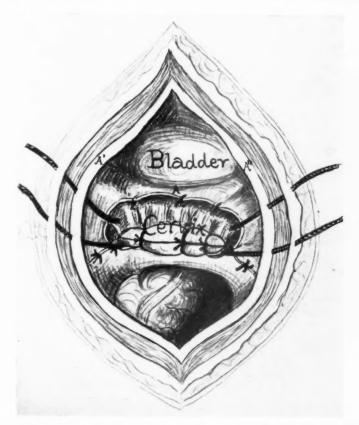


Fig. 2.—The anterior bladder peritoneum is shown sutured to the cervical stump and the broad ligament peritoneum is likewise closed. The cervical stump is not covered by peritoneum. Two heavy chromic ventrofixation sutures have been passed. During the peritoneal closure the three points A, A^{\dagger} , and $A^{\dagger\dagger}$ are brought together by suture.

tions come together. Unlike Polk's directions, the sutures do not include the vagina. In order to prevent harm and infection resulting from accidental puncture of the vagina, I am in the habit of having the vagina disinfected beforehand by means of an acctone solution of mercurochrome. Starting from below upward, the chromic catgut sutures are tied. This brings the fascial layers together in the middle line.

The upper edge of the peritoneum reflected over the bladder is now sutured by means of the interrupted sutures about one inch below the upper region of the

cervical stump, anteriorly and laterally in the fashion shown in Fig. 2. This insures a large area of cervix denuded of peritoneum. The remainder of the peritoneal gap is closed as in every hysterectomy.

Ventrofixation sutures are now passed, starting on the right side. They penetrate the outer rectus sheath about one-half inch from the wound margin, next take in the peritoneum, and traverse the anterior extraperitoneal portion of the cervix from right to left. Emerging on the left side the suture passes through the left peritoneal

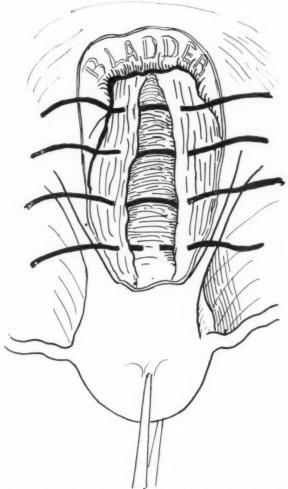


Fig. 3.—Intraabdominal reefing of pubocervical ligaments without hysterectomy. The uterovesical fold has been incised transversely; the bladder separated from the uterus and transverse sutures passed through the pubocervical fascia. The uppermost suture takes in cervical tissue.

edge and makes its exit through the rectus sheath on the left side. A second heavy chromic gut suture is similarly passed about one-half inch behind the first one. (Fig. 2.)

Peritoneal closure is effected by means of a peritoneal suture which includes the bladder peritoneum at its lower angle, and extraperitonealizes the entire uncovered cervical area. After complete closure of the peritoneum, the ventrofixation sutures are carefully tied, thus bringing cervical tissue in direct contact with the rectus sheath. The fascia and superficial tissues are closed by interrupted sutures in the usual fashion. A large packing is inserted in the vagina for two days in order to raise up the cervix and take off unnecessary strains from the ventrofixation sutures.

The results so far have been gratifying, the anterior vaginal wall being pulled up in a manner not obtainable by any operation performed from below, even when

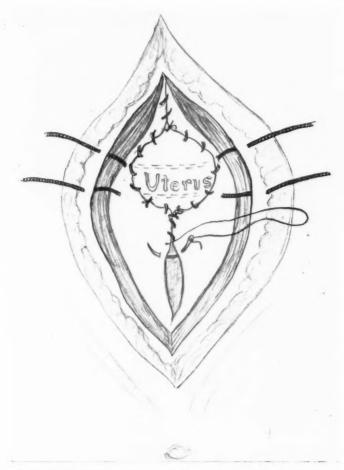


Fig. 4.—Ventrofixation with extraperitonealization of the uterine fundus. Shows peritoneum almost closed and ventrofixation sutures passed.

combined with ventrofixation of the stump. These results are in marked contrast to the case in which ventrofixation of the cervical stump after hysterectomy was unaccompanied by reefing of the fascial planes. Here an enlargement of the cystocele was noted.

2. Without Hysterectomy.—Encouraged by these results, I have enlarged the application of this technic to other conditions. The most recent indication has been a patient with recurring prolapse and cystocele who had been subjected to five previous operations from below, two combined with laparotomy. Although the large billiard ball cystocele appeared to be densely adherent to the anterior vaginal

wall and therefore much trouble was anticipated in separating vagina and bladder within the abdomen, I was pleasantly surprised by the ease with which this separation could be effected.

After opening the abdomen and cutting a three-inch, long, thin band uniting the uterus and abdominal wall, the sole remains of the previously performed ventro-fixation (done by a different method than my own), the bladder peritoneum was incised from one round ligament to the other, and the uterus pulled backward and upward as shown in Fig. 3. The bladder was separated from the vaginal wall with surprising ease, to within a very short distance of the external meatus. By eareful blunt dissection the fascial planes were exposed laterally without undue hemorrhage. The usual chromic gut sutures were passed as shown in Fig. 3, using a hemostatic needle as is always advisable. After these sutures were tied, the bladder was pulled upward and the peritoneum closed from round ligament to round ligament by interrupted sutures.

Thereupon the uterus was ventrofixed in the same fashion as the cervical stump (see Fig. 4), a technic somewhat modified from Kocher's extraperitoneal ventrofixation. By this technic, an area of the uterine fundus, fully the diameter of a 50 cent piece, is extraperitonealized and brought in direct contact with the rectus fascia. This is the type of ventrofixation that I regularly use in all conditions of prolapse.

I have been sufficiently encouraged by my results to now further extend the application of the modified Polk operation to other conditions.

At my suggestion, on my service this type of cystocele operation and ventrofixation was performed on a woman of seventy years with complete prolapse, under spinal anesthesia, the entire procedure occupying thirty-five minutes. If subsequently a perineorrhaphy is necessary, this will be done under parasacral anesthesia.

INDICATIONS FOR THE OPERATION

The technic of hysterectomy combined with reefing of the anterior fascia and extraperitonealization of the cervical stump is indicated in cases of fibromyomas uteri requiring abdominal hysterectomy in which there is a coincident cystocele and tendency to descent. This tendency to prolapse is frequently masked by a large uterus impinging on the pelvic brim which thus prevents the descent of the cervix and vaginal vault.

I propose to utilize this type of cystocele operation increasingly in all cases in which laparotomy is required for ventrofixation, in cases of rectocele, cystocele, and descent. Under these conditions a posterior colporrhaphy under parasacral anesthesia should be performed, the abdomen then opened, attending to the cystocele by the technic described, and completing the operation with ventrofixation.

Of the 7 patients operated upon, one patient who had a hysterectomy and fibroids with extraperitonealization of the stump, after an unusual afebrile convalescence of eleven days, died without warning on the eleventh day, from pulmonary embolus. Autopsy showed a typical large saddle thrombus occluding the two largest branches of

the pulmonary artery. The operative field had healed perfectly and there were no local thrombi to be found. Had the lethal outcome occurred with my first case, unquestionably I would have been frightened off from attempting further operations of this type. As, however, death from embolism occurs both after hysterectomy for fibromyomas of the uterus as well as in plastic operation with undue frequency, I consider this no reason to consider this more than the unavoidable tragic death from embolism to be occasionally expected.

The operation is technically not difficult if care be taken to avoid hemorrhage. If venous hemorrhage occurs, it can usually be checked by means of a carefully applied long artery forceps and ligation. Packing with dry gauze stops the venous oozing, which is further checked by approximation of the sutures. The ureters are in no danger if the sutures are passed, by sight, with the bladder well retracted, as the lower end of the ureter mobilizes with the trigonum and bladder. The contraindications to the operation are the presence of dense inflammatory exudates and adhesions which impair the mobility of the organs occupying the anterior portion of the pelvis.

Note: Since the writing of this paper, 9 additional patients were operated upon for cystocele, complicated by prolapse, rectocele, fibroid or dermoid cysts, by 4 different operators. The reefing of the pubocervical fascia, as described above, was done in conjunction with the extraperitoneal fixation of the uterus or cervical stump.

10 EAST EIGHTY-FIFTH STREET.

URETEROVAGINAL FISTULA SECONDARY TO A HIGH FORCEPS DELIVERY

By Raymond E. Watkins, M.D., Portland, Oregon (From the Department of Gynecology, University of Oregon Medical School, Portland, Oregon)

INJURIES to the ureter occurring in the course of a pelvic operation are quite frequent. In the many reports of such accidents, the cause and prevention of these injuries, as well as the method of dealing with them, have been discussed. An injury to the ureter during labor, however, is extremely rare. One has to search carefully to find any definite record on this subject. Some authors of obstetrics mention that injuries of this type may occur, but with that they dismiss the subject. In a report on this type of injury by Judd,* there were cited but two instances of ureterovaginal fistulas in which the injury was due to childbirth. Judd reports that in a large series of obstetric cases, Markoe had but one case at the New York Lying-In Hospital. In view of these facts I am sure the following case report will be of interest.

^{*}Collected Papers of Mayo Clinic, 8: 1916.

Mrs. A. M. I., married, aged twenty-four, consulted me on September 10, 1925, concerning a constant loss of urine. This condition began after a difficult labor, two and one-half months previously. The patient stated that she had pain in the region of the kidneys on both sides, which radiated around to the pelvis. She had had fever and chills nearly every day since the trouble began. Not all of the urine escaped, as the patient stated that she had voided two to four ounces of urine every two or three hours.

The patient was normal throughout her pregnancy and began labor at term on July 4, 1925. After twelve hours she was given an ether anesthetic and high forceps were applied. The delivery was very difficult, the patient being under an anesthetic about two and one-half hours. The baby was born dead. This delivery occurred in a small Oregon town and the patient was confined in her own home by a local physician. Following the delivery, she was unable to void and had to be catheterized for nearly a week. About this time she began to notice urine on her nightgown and the bed clothes. She remained in bed three weeks,

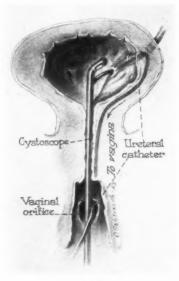


Fig 1.

When she was up and around again she began to have chills and fever nearly every day, which made her so ill that she was unable to carry on her duties about her home.

Her family history is unimportant. Menstruation began at twelve years of age, was of the twenty-eight day type, the flow lasted seven days and was rather profuse with occasional cramp-like pains. She did not have leucorrhea previous to pregnancy. No history of previous urinary disturbance. No symptoms referable to the gastrointestinal tract.

Examination.—The head, neck, chest, and cardiovascular system were negative. The abdomen was soft and flaccid. Palpation in the region of the right kidney and along the course of the right ureter showed moderate tenderness. There was considerable tenderness in the region of the midline of the abdomen just above the pubis. No masses or other pathology was found. Pelvie examination revealed a marked inflammatory condition of the vulva. There was a second degree perineal laceration well healed. The anterior vaginal wall was relaxed and

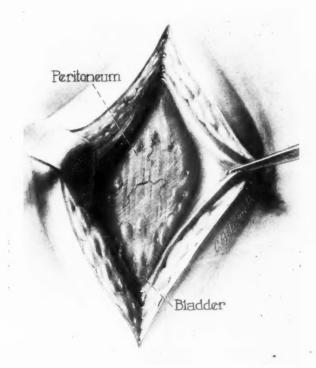


Fig. 2.

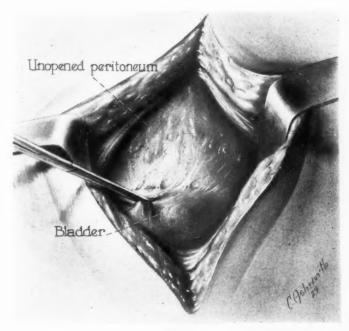


Fig. 3.

bulged moderately on straining. The cervix had a wide lateral laceration extending into the left vaginal vault and broad ligament. The uterus was in anterior position and of normal size. There was no evidence of a fistula in the anterior vaginal wall. The bladder was filled with boric solution and no leakage by vagina was observed.

An observation cystoscope was passed. Acute trigonitis was present, but the bladder was otherwise normal, there being no evidence of injury to the bladder walls. The following day a cystoscopic examination was made at the hospital to determine the condition of the kidneys and the ureters. The right ureteral catheter passed without difficulty; the left entered the ureteral orifice, and after passing about 3 cm. met an obstruction. On being forced it suddenly overcame the obstruction and passed freely but was found to have come out at the vaginal

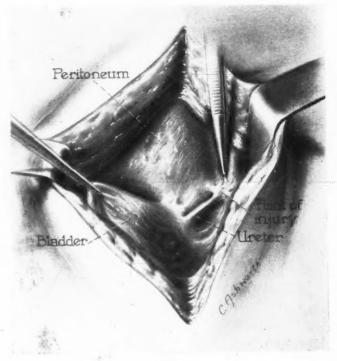


Fig. 1.

opening, thereby establishing the diagnosis of fistula of the left ureter at the point where the laceration of the cervix extended into the vaginal wall. (Fig. 1.) An attempt to pass a catheter through this opening up to the kidney was unsuccessful. The function of the right kidney was impaired and cultures of the urine showed a colon bacillus growth. The bladder culture revealed the same organism.

Upon admittance to the hospital this patient had an afternoon temperature ranging from 100° to 102° daily, which dropped to 99° in the morning. Her pulse was regular ranging from 90 to 110, with respirations of about 20. Her blood count showed a red count of 4,420,000, with hemoglobin of 75 per cent. There was a leucocytosis of 16,550 with 81 per cent polymorphonuclear leucocytes. The Wassermann was negative. Urine showed many pus cells, with an occasional blood cell.

On September 18, the day of operation, an attempt was made to locate the fistula vaginally with the idea of closure. This failed to expose it sufficiently, because of scar tissue and fixation high in the vault of the vagina. It was then decided to make a suprapuble incision and transplant the ureter into the bladder by the extraperitoneal operation described by Judd. On freeing the bladder from the front of the uterus and working laterally in the left wall of the pelvis (Figs. 2 and 3), it was found that the ureter was so bound down in a mass of adhesions that it could not be satisfactorily exposed (Fig. 4). An opening was made in the peritoneum and the ureter located where it passes over the bifurcation of the iliac vessels (Fig. 5). It was exposed from this point downward and freed

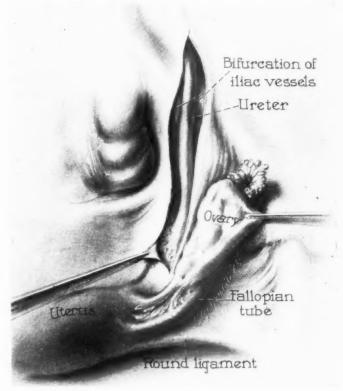


Fig. 5.

somewhat to a point where it seemed firmly fixed (Fig. 6). At this location the ureter was severed and the cut end transplanted through a small incision into the left lateral wall of the bladder (Fig. 7). The end of the ureter was split, the ureter pushed into the bladder, and the two ends stitched to the mucosa of the bladder (Fig. 7, a and b). The wall of the bladder was then carefully stitched around the ureter, making an inverted trough (Fig. 7, c and d). The adjacent perivesical tissue was tacked to the bladder in such a way as to prevent tension on the ureter. Fine chromic catgut was used. A rubber tissue drain was placed down to the side of the transplantation. The openings in the peritoneum were closed, and a cigarette drain was left in the abdomen in the middle of the wound.

Aside from a rather irregular temperature, which undoubtedly was due in a large measure to her pyelitis, the patient made an uneventful recovery. There was

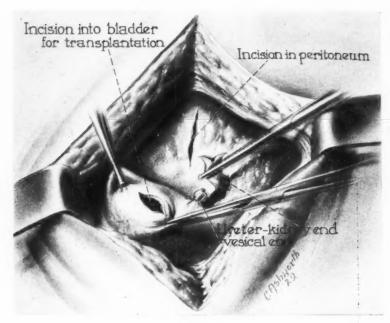


Fig. 6.

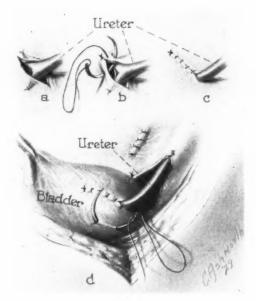


Fig. 7.

slight serous drainage from the abdominal incision for about three weeks, but this entirely cleared up and the wound closed. The patient left the hospital in good condition and returned to her home. Later a cystoscopy showed the new ureteral orifice, around which was a normal appearing bladder wall. Jets of urine could be seen coming through this opening at regular intervals. At the time the patient left the hospital she had full control of her bladder, and the vaginal leakage had ceased.

The subsequent history of this patient is interesting. August 23, 1926, she again consulted me, stating that she had not menstruated since May 12. Examination showed a pregnancy corresponding to the length of time she had missed her periods. Inasmuch as the cervix was firmly fixed high in the upper left vaginal vault, and with the history of a former very difficult labor and the above operation only a few months previously, much concern was felt about the outcome of this pregnancy. Her urine had never been free from pus since her first attack of pyelitis, which occurred shortly after the injury to the ureter. She had a justominor type of pelvis with a true conjugate of 10 cm.

The patient was kept under careful observation. In November she had an acute attack of pyelitis which lasted fifteen days. She then remained free from complications until January 1, when the bag of waters ruptured while she was riding on the train coming to Portland from her home about one hundred miles distant. On her arrival here she was sent to Emanuel Maternity Hospital and put to bed. She immediately went into labor and after cleven hours gave birth to a premature baby, weighing four pounds and nine ounces. Her convalescence was uncomplicated and she left the hospital on the fourteenth day in good condition. The baby was kept in the incubator and given mother's milk; it thrived from the beginning. A month later the baby weighed six pounds and was taken home.

Since the delivery, the mother has remained in good health and is able to care for her baby as well as do her housework. The infection of the urinary tract has resisted all types of treatment and still persists, but in mild form.

In the consideration of this case at the time of the operation, it was necessary to make a choice between ureteral transplantation and a nephrectomy. Since the opposite kidney was not only infected but the function impaired as well, a nephrectomy would have been attended with considerable risk. Ureteral transplantation into the bladder is a rational procedure and should be the method of choice in the hands of a competent surgeon.

610 MEDICAL DENTAL BUILDING.

THE EFFECTS OF PREGNANCY ON BLOOD CIRCULATION IN THEIR RELATION TO SO-CALLED TOXEMIA

By J. C. Beker, M.D., Arnhem, Holland

WE USE the term toxemia of pregnancy though we do not know specifically any substance that is responsible for this assumed intoxication. It seems to me entirely possible that such a toxin will never be found, since all the clinical phenomena typical of this condition can be explained by definite changes in the circulatory system during pregnancy.

I shall begin with a brief summary of alterations in blood circulation occurring during pregnancy under physiologic conditions.

The uterine wall becomes hypertrophied and included in this hypertrophy are both the arteries and veins. The growing uterus requires a larger supply of blood. More blood is carried to the uterus during pregnancy as result of such hypertrophic changes in the vessels which, according to Freund, more than double the caliber of the arteries. Through them more blood flows to uterus and the surrounding tissues. This obviously is possible only in the presence of more blood. An increase in the total volume of blood by 10 to 15 per cent has been ascertained by Neubauer,2 Mahnert,3 and Stander.4 Furthermore, there has been found, during pregnancy, an increase of the minute-volume output of the heart by about one-third as compared with the nonpregnant woman by the investigations of Weiss, Stander and Duncan. About two to three weeks after delivery this minute-volume output again had returned to normal. These observations were fully confirmed by the work of Frey.7 He observed this increase in heart output in the majority of cases within the first half of pregnancy. As early as the fourth month of pregnancy, he ascertained an increase of the heart both in its longitudinal and transverse diameters.

Investigations of Hinselmann,⁸ and Nevermann⁹ carried out with the capillary microscope showed that in normal pregnant women stases in the capillary flow occur approximately four times as frequently as in nonpregnant individuals.

The quantity of blood supplied to the pregnant uterus through uterine and spermatic arteries, however, also depends upon the pressure prevailing in the general circulatory system. It would be erroneous to explain the increased supply in response to the increased demand solely on the basis of the widening of the afferent vessels.

Hess¹⁰ has made it convincingly clear that the deciding factor in the proper supply of blood to any organ is found in the total resistance to the flow offered by all end ramifications in the vascular area. Therefere, a physiologically normal supply of blood for the pregnant uterus

calls not only for a widening of the vessels but as well is dependent upon the absence of any abnormal regional resistance to the blood flow, that is, chiefly within the uterine wall. With a normally growing ovum within a normally hypertrophying uterine wall, there will be no increased resistance and thus no noteworthy effect on general circulation.

Under normal conditions the circulatory system seemingly adapts itself satisfactorily to altered demands by an increase in the total amount of blood, by an enlarged minute-volume output and by a certain amount of peripheral vasoconstriction to maintain a proper level of blood pressure.

Some change is brought into the situation by the onset of labor and probably even in the last stages of pregnancy by frequent contractions of the uterus. Every uterine contraction obviously must increase the resistance offered to the blood flow. And after each contraction there must be a freer inflow of blood in order to maintain a sufficient blood supply in the intervillous spaces.

Compensation for this increased resistance during contractions must be furnished by general circulation. Fellner¹¹ ascertained an increase in the heart outure and in blood pressure with the beginning of labor. Peripherally observed, the number of stases in the capillary stream increases in the first phases of labor by 18 per cent, and in the second stage by 28.5 per cent (Hinselmann).

In my opinion, these compensating, favorable reactions in the general circulatory system are induced by the augmentation of regional resistance in the uterus and required for securing an adequate blood supply for the fetus during and after uterine contraction.

It seems likely that vasoconstriction, easily noticed in peripheral arterioles, also occurs, and thus asserts its influence, in other organs, especially in the kidneys. An insufficient supply of arterial blood in them possibly results in the appearance of albuminuria (Lichtwitz¹²). During labor the urine commonly is found to contain albumin and even easts.

Parturition, it is my belief, often pushes the function of the circulatory system to its physiologic limits. We have seen that to pass through pregnancy and labor within such limits the following conditions must be fulfilled: (1) The heart must be capable of enlarging its minute-volume output; (2) peripheral arterioles must undergo a certain degree of constriction; (3) the arteries of the uterus must adequately hypertrophy; and (4) the uterine muscle must remain in a state of tension which does not offer an abnormal resistance to blood flow.

Complications, therefore, might arise from any of the four mentioned and requisite conditions.

(1) A disturbance in required cardiac function is to be expected if a heart lesion antedating impregnation already has required an increased minute-volume output to prevent decompensation. This holds particularly true for an aortic stenosis, since here further increase of the minute-volume could be obtained only with evident difficulty.

During pregnancy particular attention is required for women in whom a constitutional hypoplasia of the arterial system is responsible for subarterialization of certain organs.

(2) Difficulties in the peripheral circulation can be expected in women in whom such conditions as essential hypertension or a chronic nephritis have already, before impregnation, increased the demands on the



Fig. 1.—Phimiparous cow, two months pregnant in left horn.

circulatory system. Even with pregnancy itself progressing normally further requirements on necessary vasoconstriction may seriously affect circulation in other organs. In this manner might be satisfactorily explained a pregnancy nephritis and eclamptic convulsions in older multiparae who have safely passed through preceding pregnancies.

(3) Considering next insufficient hypertrophy of uterine vessels, we must remember the evident anatomic differences between the uterus of a primiparous and that of a multiparous woman. Unable to secure for demonstration of this difference human uteri I injected, after the method

of Gross,¹³ the arteries of uteri of cows with barium gelatin and took x-ray pictures. The illustrations here shown (Figs. 1 and 2) represent the uteri of cows, both two months pregnant, the one a primigravida, the other a multipara. In the multiparous animal the uterine wall is thicker and its arteries of a markedly larger caliber.

(4) Obviously the development of the blood vessels in pregnancy is closely related to the hypertrophic development of the myometrium. Therefore, the same difference between a primiparous and a multiparous uterus will exist in regard to uterine wall that was pointed out above in regard to uterine vessels. Less additional hypertrophic growth of the muscle will be required in the multiparous organ to attain competent functional ability, decidedly more in the uterus of the primigravida.



Fig. 2.—Multiparous cow, two months pregnant in left horn.

I have pointed out how during a uterine contraction resistance to blood flow is increased, and this resistance must be overcome by a rise in general blood pressure. But also between contractions the required increase of afflux of arterial blood into the intravillous spaces is dependent on a normal tonus of the uterine wall. In a previous paper¹⁴ I have explained how the tonus of the uterine muscle changes under the influence of the uterine contents. It must be assumed that under normal conditions this change in tonicity will be such as to guarantee a sufficient blood supply for the fetus in spite of contractions late in pregnancy or during labor.

It seems logical that too high a tonus of the uterine muscle might result either from a deficient muscle hypertrophy or from the impossibility of adequately prompt hypertrophy on account of unduly rapid increase in the size of the uterine contents. This first form of actual deficiency then is most likely to obtain in the primigravida, and the second form of relative deficiency prone to occur in cases of multiple pregnancy, of hydramnion or of placental ablation with copious hemorrhage.

Abnormally high tonicity of the uterine wall means abnormally high resistance in a part of the circulatory system. As protective and remedial reactions then must be expected a rise of general blood pressure which is achieved by increase of the cardiac output, and vasoconstriction in peripheral areas and within certain organs.

In comparison to the intermittent and only temporary interference with blood flow through the uterine wall during labor, the abnormally high tonicity of the insufficiently developed or of the abnormally distended uterine wall during the latter part of pregnancy represents a chronic and long persisting condition. Thus the aforementioned reactive and protective changes in general circulation will be persisting. The rise in blood pressure will continue. Very frequently interrupted capillary flow will reduce blood flow through certain organs to a degree not any longer compatible with their anatomic and functional integrity. I believe that in this manner are satisfactorily explained such clinical phenomena and pathologic findings as hypertension, albuminuria and evidences of anatomic damage in kidneys or liver. From the foregoing it seems obvious why these disturbances, termed toxemia, as a matter of fact are observed so much more frequently in the primigravida or in the course of a multiple pregnancy.

We should differentiate between two forms of "toxemia." The one due to this abnormal resistance offered to blood circulation within the uterine wall, and another the result of insufficient heart action or insufficient blood supply to certain organs on account of impaired peripheral circulation.

The accepted symptoms of toxemia appear five times as often in cases of multiple pregnancy as compared with their incidence in single pregnancy. In instances of rapidly growing hydatid mole or hydramnion a kidney disorder is frequently encountered. Also the clinical signs of toxemia in connection with ablatic placentae might be explained on the basis of abnormal tension of the uterine wall.

What will be the reaction of general circulation to accomplished delivery?

Frey noticed that within fifteen minutes after delivery the minute-volume decreased from 10.4 to 8.4. In regard to peripheral vasoconstriction, Hinselmann observed that stases amount in the second stage of labor to 28 per cent, but one hour postpartum to only 8 per cent, after twenty-four hours to 6 per cent, two to five days postpartum to only 2.4 per cent. As a rule the urinary output quickly increases and albumin gradually disappears. During normal delivery blood pressure usually

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rises 10 to 20 mm. Hg. (Vignes, 15 Schwarz 16) and often returns to its previous level within ten minutes after delivery. After a normal delivery the general circulation will have attained normal conditions within a few hours.

When during pregnancy or labor the symptoms of so-called "toxemia" are evident the various pathologic phenomena disappear more slowly.

The uterus of a "toxic" patient usually contracts promptly and often reduces the actual blood loss below normal. Thus often the total quantity of blood retained within the circulatory system will remain relatively large and this fact in itself is prone to interfere with speedy return to normal conditions. The arterial hypertension as a rule decreases after delivery but not always. In some instances the fall is sudden and great, up to 100 mm. (Schwarz), in many others the decrease ensues very slowly. De Snoo¹⁷ points to the important fact that the abnormally high blood pressure will in many cases fall only to rise again afterward. Hinselmann definitely ascertained that in the toxemic patients the number of stases will not decrease for some time. It seems probable that this process of restoration is greatly dependent upon the extent and degree of pathologic tissue changes and whether regeneration is quickly or at all possible.

On the other hand, we certainly see cases of hypertension, caused by increased minute-volume cardiac output and excessive peripheral vaso-constriction, in which the reaction is so sharp, and sudden widening of constricted arterioles results in so sudden and deep a drop in blood pressure that the heart cannot respond with sufficient promptness. If not properly managed these patients will die in shock. There cannot be any doubt that in cases of marked hypertension the danger to the patient is by far greater immediately after delivery than it had been before.

CONCLUSIONS

The normal changes of general circulation during pregnancy, labor and the puerperium are of great significance.

Resistance to blood flow through the normal wall of the pregnant uterus does affect general circulation in a definite manner.

When this uterine resistance becomes abnormally large, and especially in an individual whose circulatory system is incapable to compensate fully for even only the physiologic increase in resistance, the development of certain pathologic conditions, usually ascribed to a toxemia, becomes almost inevitable.

In these patients, in the presence of marked hypertension, great danger arises when the circulatory system does not adjust itself promptly to the change of conditions brought about by delivery.

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A THEORETICAL CONSIDERATION OF THE ETIOLOGY OF THE TOXEMIAS OF PREGNANCY

By Reuben L. Larsen, A.B., M.D., Evanston, Illinois (Clinical Assistant in Gynecology, Northwestern University Medical School, Chicago)

THERE are two great methods of reasoning, the inductive and the deductive. Making deductions from an established premise may be the safer method but induction of a conclusion from a number of facts is the more fascinating. While inductive conclusions often require confirmation, their promulgation may be productive of important knowledge.

Deductive methods have failed to clear up the question of the etiology of the toxemias of pregnancy. However, a great amount of work has been done in the endeavor and a certain number of facts have been established. Among these is the fact that a carbohydrate depletion and an acidosis (or hypoalkalinity) exist in the persons afflicted with such a toxemia and that they are benefited by the administration of glucose and alkalis. But though the fact exists the reason for its existence is not apparent. Many theories have been advanced. None suffice.

Anyone who is interested in obstetrics has given thought to this question. After the failures of many careful and capable investigators, the solution has not appeared hopeful. The stimulus for the theory we herein discuss came from an article on the "Newer Aspects of Liver Disease" by Andrews, Thomas and Schlegel. While their paper did not carry a suggestion of the applicability of their findings to the conditions we are considering, it appears to us that they may have an important bearing on them.

It has been shown by many investigators that the permeability of cells is dependent upon and varies with the mineral salt content of the cells. To support the life of the cell a very delicate balance of the calcium ions on the one side and the sodium and potassium ions on the other must be maintained. An excess of calcium ions causes lessened permeability which may progress to the point of absolute impermeability and consequent loss of the power of absorption and excretion through its cell membrane. An excess of potassium or sodium causes an increase of the permeability of the cell which may progress to the point of dissolution of the cell through its own membrane.

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Mason and his coworkers,² a few years ago, demonstrated that if small amounts of liver were removed and dropped back into a dog's abdomen a toxemia ensued which was rapidly fatal. Death within eighteen to twenty-four hours resulted from using only a few grams of liver in this way. These experiments were criticized as having probably caused death by peritonitis. To check them, Andrews and his coworkers repeated the procedure but inserted the liver fragments into the chest and axilla. The results were the same. The assumption that death was due to a liver protein poisoning was inevitable. With these and other facts in mind Andrews, Thomas and Schlegel undertook their study. They state, "It is obvious, therefore, that there is a substance in the liver which can cause severe toxemias. . . ."

These investigators then produced artificial hepatic disease by tying the common bile ducts in some dogs and by causing ether toxemia in others. A study of each dog's urine and of the mineral salt content of normal and pathologic dog livers was made. In both types of liver disease produced, early specimens of urine showed a protein which reacted to antisera which were sensitive to dog livers and did not react to antisera sensitive to dog blood. From this they concluded that the urinary protein positively originated in the liver. Their study of the mineral salt content of the pathologic livers showed a marked decrease in calcium, only a slight variation in potassium, and an enormous increase in sodium. Such an imbalance of the mineral salt ions would account for the dissolution of the cells which a microscopic examination showed to have taken place. They conclude that, in all probability, the protein found in the urine is leakage from the liver cells due to their greatly increased permeability following the disturbance of the mineral salt balance.

How may these findings be applied to a solution of the etiology of the toxemias of pregnancy?

Are hyperemesis gravidarum and eclampsia two distinct conditions with independent pathologic bases and of different etiology? Their clinical manifestations have enough in common to stamp them as closely related conditions. Hyperemesis usually occurs in the first trimester and eclampsia in the last. Practically never do both occur in the same pregnancy. We are inclined to believe that eclampsia is a manifestation of an accumulative action of the same causative factors involved in the etiology of hyperemesis but occurring in those women who have been able to withstand the invasion in the early months. The final breaking down of this resistance results in the storm of symptoms known as eclampsia rather than in the milder condition of hyperemesis. Thus it would be possible to have the same etiologic basis for both.

The developing fetus is a parasite, preying upon its parent for existence. That there is an unusual demand for calcium is evidenced by

the pathologic changes that sometimes take place in a pregnant woman, such as osseous changes and caries of the teeth. It has been estimated that a fetus may withdraw as much as 100 gm. of calcium from its host, during the process of gestation. If the withdrawn calcium is not replaced through a proper diet or, if it be ingested but not metabolized. it is not difficult to conceive of an imbalance of minerals in the liver cells resulting and with this an increase in the permeability of these cells. There will follow an outpouring of the glycogen stored there. with a consequent depletion of carbohydrates. As is well known to physiologists and pathologists, an organ which becomes deficient in the performance of its function will ofttimes make extraordinary efforts to compensate and thereby sometimes function pathologically. In the presence of an increased permeability of its cell membranes, the liver cells, having depleted themselves of their glycogen stores, in a vain endeavor to compensate, will secrete into the system certain toxic proteins which would never pass through the membranes of cells with normal permeability. The resulting toxemia would manifest itself, in the early months of pregnancy, either as the ordinary vomiting of pregnancy or, if adjustment to conditions did not soon take place, as hyperemesis. In the later months, due to cumulative action of the toxic material, those who had resisted the early invasion of these toxins, but who had not actually adjusted themselves to the altered conditions, would suddenly be overwhelmed and manifest the defeat by the condition known as eclampsia.

The blood does not show any characteristic changes as to mineral content, either in normal pregnancy or in the toxemias. We have run a small series of blood examinations during pregnancy and were unable to demonstrate any abnormalities in the ratio of calcium against sodium and potassium. This does not, however, eliminate the possibility of an imbalance existing in the liver cells as was demonstrated by Andrews and his coworkers.

A consideration of the matter of calcium deficiency involves more than a regulation of calcium intake as the condition may exist in the presence of an abundance of calcium ingestion unless it is metabolized.

Pregnancy places a strain on all the body functions. That the endocrine system may suffer is shown when pregnancy occurs in a woman suffering from hyperthyroidism. It is thought that the parathyroid glands, either alone or in conjunction with the thyroid, govern calcium metabolism and that they serve to neutralize toxic wastes and contribute toward the maintenance of blood alkalinity. If the thyroid gland suffers and sometimes breaks under the strain of pregnancy why may not the parathyroids suffer and likewise break? If the functions attributed to these glands are correct their failure will establish a vicious train of events. First, the deficient calcium metabolism may cause an imbalance of mineral salt content and an increase in the per-

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meability of the liver cells. A carbohydrate depletion then ensues. In their desperate efforts to secrete, the liver cells pour out their own toxic proteins. This process may progress to the point of dissolution of the cells as seen in sections of eclamptic livers. Normally, toxic wastes are neutralized by the parathyroids but now, in their impaired state, they are unable to accomplish this. They fail to control a situation brought about by their own deficiency.

If this theory has any merit, the treatment will suggest itself. Prophylaxis will, of course, be of greatest import. If it be a matter of mere insufficiency of calcium intake, an abundance of calcium salts taken by mouth may prove effective. None are easily assimilable though the lactate is perhaps best. If it be a matter of deficiency of calcium metabolism in spite of sufficient intake, the administration of an extract of parathyroid gland may be indicated. Parathormone appears to be an efficient preparation. The early routine use of this procedure may be of value as a prophylactic measure. In the active treatment, the present use of glucose and alkalis may be supplemented by the use of calcium and parathormone.

In the active treatment of eclampsia, magnesium sulphate has attained an important position. The value of this salt, when injected parenterally, is supposed to lie in its own sedative property and its synergistic action when combined with morphine. If our theory as to the etiology of the toxemias of pregnancy is correct, it is quite likely that the favorable action of magnesium sulphate may have a deeper significance.

Mendel and Benedict^a have shown in their work that "the increased excretion of calcium is accompanied by a rise in the urinary output of magnesium." They further state that "the injection of either calcium or magnesium brings about the presence of an increased amount of either metal in the blood" which, they suggest, is "an antitoxic compensatory response of the organism whereby the toxic action of the injected metal is, to some extent, overcome."

In other words, calcium and magnesium, in the human physiology, are compensatory and complementary to each other. They are, in a sense, antagonists and the increase of one stimulates an increase in the other as a safeguard against possible toxicity. If this be true, may it not also be true that the injection of magnesium sulphate in eclampsia causes the body to draw upon its available calcium thus raising the calcium content of its cells? If the toxemia is due to an imbalance of the mineral content of the liver cells (calcium deficiency) with a consequent increased permeability of these cells and an outpouring of their toxic proteins, then the injection of magnesium with its accompanying rise in the calcium level will tend to alleviate the condition by normalizing the mineral ratio between calcium and sodium and potas-

sium. The permeability of the cells will be reduced to the normal state and the secretion, into the organism, of their toxic contents will be inhibited.

In rachitis the metabolism of calcium is intimately associated with that of phosphorus. A partial examination of the literature shows a general agreement in the opinion that rachitis is accompanied by a deficiency of both calcium and phosphorus and that each of these elements are essential in the treatment. Sittler⁴ gives a combination of nucleinic acid with calcium glycerophosphate. Huenekens⁵ uses tricalcium phosphate. Orr, Holt, Wilkins, and Boone⁶ state that rachitis is due to the failure to retain calcium and phosphorus. They also show that irradiation of the patient with ultraviolet rays causes a large amount of calcium and phosphorus to be retained. Others have shown that irradiation of certain oils with ultraviolet rays gives these oils antirachitic properties. These observations may explain the specific action of cod liver oil in rickets in that it causes the body to retain calcium and phosphorus.

Because of the interdependence of these two elements in rickets, it would be of interest to know if the presence of phosphorus, which is found in nearly all the body cells, is essential to the metabolism of ealcium. If so, it would assume an important position in our theoretical consideration of the etiology of the toxemias of pregnancy. Furthermore, if exposure of the body to ultraviolet rays causes a retention of its calcium and phosphorus and if our theory is correct, irradiation with ultraviolet rays would have a place in the treatment of these toxemias.

We venture to predict that a further investigation of the calcium, phosphorus, and magnesium metabolism, with their possible interrelationship and interdependence, may clear up, at least in part, the etiology of the toxemias of pregnancy and may provide a means of preventing and treating the conditions.

As stated in the title of this paper our discussion is a purely theoretical one, an endeavor to explain a vexing question through inductive reasoning. If the theory has been advanced before, we are not aware of it. If it stimulates others to experimentally confirm or refute it, it will have served its purpose.

We wish to express a real appreciation to Miss Λ . A. Jansen, Director of the North Shore Clinical Laboratory, for helpful information and suggestions concerning the mineral content of the blood and for the chemical examination of a series of blood specimens from pregnant women.

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THE DIAGNOSIS OF ECTOPIC GESTATION*

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FROM A CLINICAL ANALYSIS OF 410 CASES AT BELLEVUE HOSPITAL

By Thomas E. Lavell, M.D., F.A.C.S., New York, N. Y.

ECTOPIC gestation has received much attention in medical literature but remains of peculiar interest, not only because of its potentially tragic course but because of the constantly high rate of diagnostic error.

Notwithstanding all that has been learned, there still remain several features which are not satisfactorily settled. The baffling problem of diagnosis in particular presents a continual challenge which has not been adequately answered. Toward this phase the present paper is directed in the hope that by surveying a large group of cases, we may approach a more accurate evaluation of detail and a consequent truer perspective.

EXPLANATION OF THE SERIES

The following study includes the ectopic pregnancies treated on the Gynecologic Service at Bellevue Hospital during a period of seventeen years. The series is consecutive and represents all available cases since the start of the new Bellevue record system.

Recognizing that pelvic hemorrhage is sometimes due to conditions other than ectopic pregnancy, only cases with pathologic or operative verification were considered. Four hundred and six were operated upon and 4 others demonstrated by autopsy. Many histories were incomplete in certain details, so percentages were necessarily limited to the number mentioning that detail. The charts are arranged with a view to emphasis of exceptional as well as common conditions, as this knowledge is of great value at times in doubtful cases. Indefinite statements together with equivocal diagnoses were discarded. It is to be remembered that this represents a group with symptoms and pathology advanced enough to bring them into a hospital, often in serious condition. There is therefore a disproportionate absence of early cases preceding tubal rupture or abortion.

GENERAL CONSIDERATIONS

Age incidence ranged throughout the entire childbearing period, with a notable concentration between twenty-five and twenty-nine years. Race, as well as nativity, apparently followed that of the general hospital population, though this could not be verified. There were 176 white and 24 black patients. Histories were usually obtained by in-

^{*}Read, by invitation, before the New York Obstetrical Society, March 12, 1929.

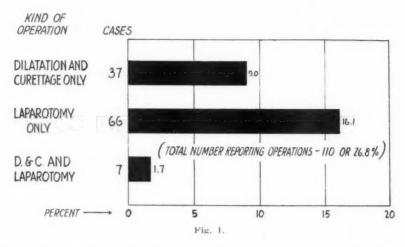
ternes or student clerks and later checked by attending staff. Length of time in hospital before operation may be taken as a gauge of diagnostic difficulty.

About 50 per cent were operated upon within twenty-four hours after admission, while the remainder required a more or less prolonged period of observation to establish a diagnosis.

HISTORY OF PELVIC INFLAMMATION

Athough there was a surprising lack of history of pelvic inflammation, puerperal or venereal, that had been treated palliatively at home or in the hospital, there was a very large number of women (26.8 per cent) who had had previous operations on the pelvic organs. The

PAST HISTORY-OPERATIONS ON PELVIC ORGANS WOMEN WITH ECTOPIC PREGNANCIES



inference may be drawn that the pathology was of mild type, not enough to cause sterility and suitable for more or less conservative surgery. We cannot escape the possibility also that the operation itself may have been a damaging factor which predisposed to later ectopic gestation. (Fig. 1.)*

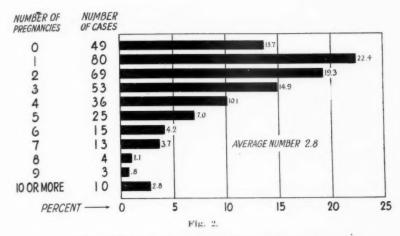
PREVIOUS PREGNANCIES

The average number of previous pregnancies was 2.8, and of children born was 2.3. This record of childbearing would compare very favorably with that of any cross-section of the married female population of this age group. As the number of abortions was relatively

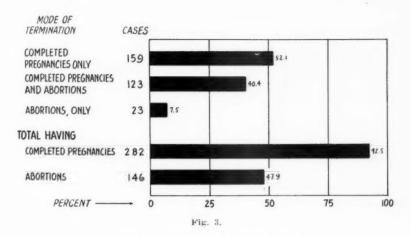
^{*}I am greatly indebted to Mr. Herbert Marks of the Statistical Department of the Metropolitan Life Insurance Co. for assistance and advice in the preparation of the accompanying charts.

small, it is probable that abortion is of little importance as a causative factor. No increased incidence of puerperal complications was noted. (Fig. 2.)

NUMBER OF PREVIOUS PREGNANCIES OF WOMEN WITH ECTOPIC PREGNANCIES



TERMINATION OF PREVIOUS PREGNANCIES OF WOMEN WITH ECTOPIC PREGNANCIES

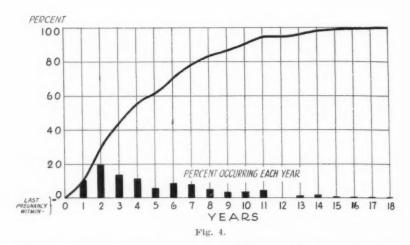


INTERVAL SINCE LAST PREGNANCY

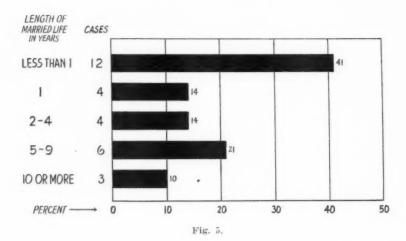
A prevalent idea concerning ectopic pregnancy is that this condition is usually preceded by a long period of sterility. It is to be noted that approximately 25 per cent had their last pregnancies within two years, 44 per cent within three years, 61 per cent within five years.

Of 49 women whose first pregnancy was ectopic, 11 were unmarried and may be presumed to have used contraceptive measures. Of the remaining 29 cases whose length of married life could be learned, 41

WOMEN WITH ECTOPIC PREGNANCIES WHOSE LAST PREGNANCY OCCURRED WITHIN SPECIFIED TIME



WOMEN WITH ECTOPIC FIRST PREGNANCIES WHO WERE MARRIED WITHIN SPECIFIED TIME



per cent became pregnant within one year, and 55 per cent in less than two years. Among the others of longer duration, a certain percentage no doubt practiced contraception. If the fault is presumed to be in the male in about 50 per cent of the cases, it is apparent we have

remaining only a small number who could be called relatively sterile. (Figs. 3, 4, 5.)

PAIN

Abdominal pain was present in some form in every case where the history was reliable or complete. This pain is characteristically variable, with sudden exacerbations, and perhaps days or weeks of ab-

CHARACTER OF ABDOMINAL PAIN IN ECTOPIC PREGNANCIES

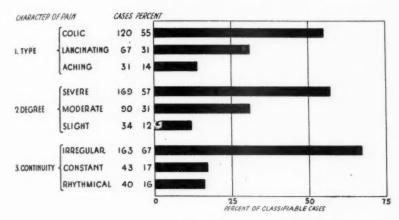


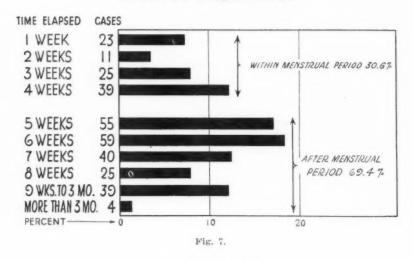
Fig. 6.

TABLE I. RADIATION OF PAIN IN ECTOPIC PREGNANCIES

PART AFFECTED	NUMBER OF CASES	CASES WITH OTHER PARTS SIMULTANEOUSLY AFFECTED
Arm	1	1
Shoulders	37	17
Right	20	11
Left	2	2
Both	13	$\begin{array}{c} 2\\3\\1\end{array}$
Not stated	2	1
Back	38	12
General	34	11
Lumbar region	4	1
Chest	10	5
Abdomen	26	4
Umbilieus	1	4
Epigastrium	18	3
General	7	
Pelvic region	29	7
Hip	2	
Rectum	19	6
Perineum	3	3
Vagina	6	3 2 8
Legs	15	8
Right	3	
Left	3	
Both	9	8

sence. Any attempt to classify it is difficult, because nearly all the types may be found in the same patient. Fig. 6, therefore, is a comparison of the predominant type in each case as brought out by a study of the whole history. It was not found that pain had any particular relationship with vaginal bleeding, although one was frequently closely followed by the other. The radiation of pain, especially to the chest or shoulders is important in diagnosis, as it probably signifies free intraperitoneal bleeding. The apparently much more common radiation to the right shoulder might be explained by attempts of the examiner to elicit symptoms of appendicitis or gall bladder disease. (Table I.)

TIME ELAPSED FROM LAST MENSTRUAL PERIOD TO APPEARANCE OF FIRST SYMPTOMS OF ECTOPIC PREGNANCY



VAGINAL BLEEDING

This resembles the abdominal pain in that it is extremely irregular and subject to remissions. The description was often indefinite, and classification is necessarily limited to outstanding features. A large majority had only slight or spotty bleeding, and long intervals with none at all. Often the only bleeding was an abortive type of menstruation at or near the regular time. A careful and detailed inquiry into the alleged last regular menstruation will frequently reveal this anomaly. There were nineteen who reported no vaginal bleeding and fourteen of these had gone beyond their regular menstrual time. Decidual casts were seldom reported by the patient or identified in the hospital. (Fig. 7.)

GENERAL SYMPTOMS

These are due to acute anemia and peritoneal or visceral irritation. An extremely valuable, but a frequently missed symptom, is the sudden asthenia due to shock from even slight internal hemorrhage. This is only a minor degree of fainting and is manifested by vertigo, sudden amblyopia, or "dark spots" before the eyes, "cold sweat," or such muscular weakness that the patient is forced to sit or lie down. This symptom, being transient and overshadowed by the accompanying pain, will often be undiscovered unless specifically inquired for in the history. Alone or with actual fainting it occurred in 57 per cent of the histories and even this figure is probably to be taken as minimal.

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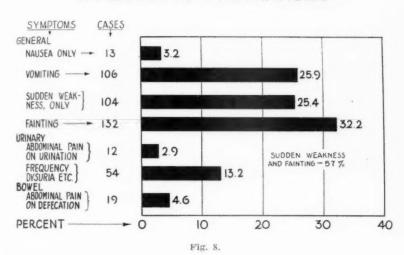
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SYMPTOM'S IN ECTOPIC PREGNANCIES



Nausea and vomiting were frequent (25.9 per cent) and may confuse the diagnosis with appendicitis. Morning sickness and breast changes were very seldom reported. Urinary symptoms were frequent but not characteristic. Abdominal pain on urination or defecation is suggestive but not typical or frequent. (Fig. 8.)

ABDOMINAL EXAMINATION

This yields nothing that is not common to other conditions. The tenderness is usually somewhat less than that of pelvic inflammation or appendicitis. The mass found is often revealed to be the uterus displaced forward by the hematocele. Cullen's sign was rarely seen and occurred twice in the same patient who had two ectopics. Distention, together with nausea and vomiting were common in this series,

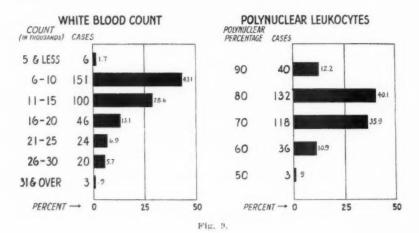
and may lead to a diagnosis of peritonitis or intestinal obstruction. In most cases, however, they are probably signs of peritoneal irritation. In 36 cases the abdominal examination was described as negative.

VAGINAL EXAMINATION

So much difficulty was experienced in tabulating the vaginal findings that a brief description is substituted.

The cervix was often reported softened and in a few cases to have a bluish discoloration. As both of these are present in many other conditions, including premenstrual congestion, it is our opinion that they are not particularly important in ectopic. Nor was the cervix in the majority of cases reported unusually tender on motion. When, how-

WHITE BLOOD COUNT AND PERCENT OF POLYNUCLEAR LEUKOCYTES IN ECTOPIC PREGNANCIES



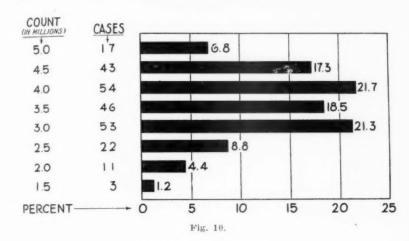
ever, acute pelvic inflammation can be ruled out, this sign may be considered highly suggestive of ectopic.

The uterus was usually found forward and was frequently described as being slightly enlarged and soft. The fundus was in many cases confused with the ectopic mass and is apt to be displaced in any direction from its normal position. A frequent early diagnosis was retroversion with threatened abortion, the small fundus being obscured by the larger soft mass behind it.

In about 10 per cent no mass was palpable. The masses in an overwhelming majority were described as soft, boggy, doughy, indefinite in outline, slightly movable, and in most cases surprisingly free from marked tenderness. In only a small number was the mass described as pulsating. Often another mass was found on the opposite side, and in more than half the cases a mass was felt in the culdesac. Rectovaginal examination was found best for the detection of free blood in this location.

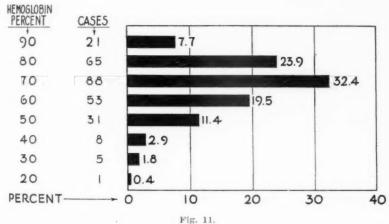
RED BLOOD COUNT IN ECTOPIC PREGNANCIES

(AVERAGE DURING PERIOD OF OBSERVATION BEFORE OPERATION)



HEMOGLOBIN IN ECTOPIC PREGNANCIES

(AVERAGE DURING PERIOD OF OBSERVATION BEFORE OPERATION)



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CLINICAL FINDINGS

Temperature in the great majority was normal. When elevated there is probably an infection of the blood mass, more common in old neglected

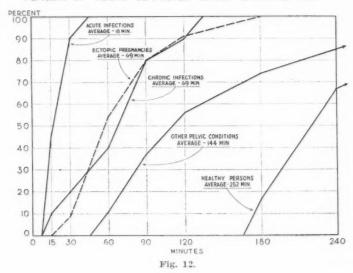
cases. Occasionally a fresh severe hemorrhage is accompanied by a temporary rise, but this quickly reverts to normal.

Pulse readings and blood pressure were found to be normal in the largest number. Frequent readings are of course valuable to determine active hemorrhage and operative prognosis. Toxic and cardiorenal complications may confuse the diagnosis.

White blood count was normal in the majority of cases. Another large group, ranging from ten to fifteen thousand, usually had a normal temperature and long sedimentation time and might be accounted for by absorption of extravasated blood. When the count was higher it indicated either active or severe recent hemorrhage or virulent infection. In this group the sedimentation test is invaluable.

SEDIMENTATION TEST OF CASES OF ECTOPIC PREGNANCIES COMPARED WITH OTHER CONDITIONS

PERCENT OF TESTS COMPLETED WITHIN SPECIFIED TIME



Red blood count and hemoglobin showed a slight average reduction. Obviously the amount of recent vaginal bleeding must be taken into consideration. Frequently repeated readings, preferably by the same examiner, are important in the detection of active bleeding. Type of blood was No. 1 in 44 cases, No. 2 in 34, No. 3 in 8, and No. 4 in 2. Wassermann was 2+ or more in 12 of the last hundred cases. (Figs. 9, 10, 11.)

SEDIMENTATION TEST

Our series is unfortunately small, as we have adopted this test only during the last eighteen months. The chart shows the result in 120 cases of various conditions for comparison. It is to be noted that the time in ectopic pregnancy followed a fairly wide range, but closely

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paralleled that found in chronic infections, and had a decided variation from acute infections and noninfected conditions. When the time was short in ectopic, it almost infallibly pointed either to an infection of the hematocele or to a coincident infection elsewhere. The chart would seem to indicate that in a majority of cases the free blood and clots or even the products of conception may either contain some latent infection or act on the blood plasma in a fashion similar to infection. However, when the sedimentation time was rapid, the abdominal blood had usually been present for a number of weeks. This test is of great value and reliability in the determination of infection. We consider it superior, to the leucocyte count. Its interpretation in the diagnosis of ectopic must be taken only in conjunction with other clinical facts. (Fig. 12.)

OPERATIVE FINDINGS

The right and left tubes were about equally involved, 131 on the right and 124 on the left. As tubal abortions usually have their origin in the outer portion of the tube, adding these to the tubal ruptures it was found that the predisposition to ectopic implantation progressively increased from the uterus toward the outer extremity.

There were twelve interstitials, one ovarian, and one abdominal pregnancy. Twin fetuses were observed three times, but there was no case of authentic bilateral tubal, or coincident uterine, pregnancy.

In this series rupture was over three times as common as abortion. Many of the so-called unruptured cases showed some evidence of beginning rupture or abortion with free intraperitoneal blood. From the very small number of truly unruptured cases seen, it is our impression that the symptoms and signs must be so slight and misleading as to make the diagnosis largely a matter of chance, and consequently replete with error.

The opposite tube was described as normal in 103, showing chronic inflammation in 81, hematosalpinx in 8, and was absent in 22 cases. In addition, the spreading hematocele with omentum and adhesions was frequently extensive enough to give the preoperative impression of bilateral mass.

SUMMARY OF TWELVE INTERSTITIAL PREGNANCIES

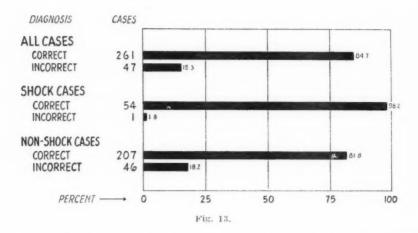
There were symptoms of shock in seven cases with corresponding rapid pulse, low blood pressure, and signs of severe anemia. Four had never been previously pregnant. Five out of nine gave no history of vaginal bleeding. In five the major symptoms occurred within four weeks of the last regular menstruation and none were over six weeks from this last period. There were two deaths; one occurring a few minutes after the patient arrived in the hospital, and one postoperative death, an operative mortality of 9 per cent.

ADDITIONAL AIDS TO DIAGNOSIS

Vaginal examination under anesthesia we consider to be hazardous and misleading, and rarely necessary.

Colpotomy is extremely valuable where there is an easily accessible mass in the culdesac which cannot be differentiated from a collection of pus. The disadvantages of this procedure are the possibility of introducing infection or increasing internal hemorrhage, and undesirable addition to operative trauma. In this series colpotomy was done 33 times and in 3 instances a postoperative pelvic infection appeared to have been the result. It is our opinion that the colpotomy wound should be closed without drainage in these cases.

ACCURACY OF DIAGNOSIS IN ECTOPIC PREGNANCIES



Aspiration of the vaginal vault is valuable under the same conditions, but is also not without danger.

Exploratory laparotomy is always an acknowledgment of diagnostic defeat. Frequently, however, the symptoms may be so alarming or the pathology so obviously requiring surgical interference that prompt operation even without a positive diagnosis is clearly indicated.

ACCURACY OF DIAGNOSIS

The diagnosis of ectopic pregnancy can most readily be made at or shortly after the occurrence of any degree of internal hemorrhage. Early in the condition the signs and symptoms may be extremely slight or indefinite, examination may show very little, and at this time there is a close resemblance to normal pregnancy with threatened abortion. Later the blood becomes clotted, organized or encapsulated, with adhe-

sions, possibly infected, and giving symptoms of pressure and mild toxemia from reabsorption. The appearance then is apt to simulate pelvic inflammation. (Fig. 13.)

Threatened or incomplete abortion and acute salpingitis are not usually revealed as preoperative diagnoses, because as such they would not come to laparotomy. Nevertheless, they are very frequently the first diagnosis. Appendicitis and other conditions not involving the pelvic organs do not appear in Table II, because these cases are transferred to the General Surgical Division of the hospital.

Previous to 1918 there were many unlabeled cases and in fact diagnosis was too often made by colpotomy or exploration. These were excluded from the table. Dr. F. C. Holden at that time instituted the rule that a written and preferably single preoperative diagnosis must be recorded by the operating surgeon.

TABLE II. DIAGNOSIS MADE IN FORTY-SEVEN WRONGLY DIAGNOSED ECTOPIC PREGNANCIES

DIAGNOSIS	NUMBER OF CASES	PERCENTAGE OF TOTAL CASES	
Total cases	47	100	
Adnexal disease, only	26	56	
Ovarian cyst	-	15	
Abort on	-1 *	. 9	
F'b omyoma	-2	4	
Pel ie abreess	2*	4	
Ruptured uterus	1	9	
Acute appendicitis	1	2	
Retroverted uterus with adnexal disease	1	2	
Retroverted pregnant uterus	1	0	
Peritonitis	1	9	
Utering polyp	1	2	

^{*}One case with adnexal disease also.

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Our total percentage of error was 15.3. The only mistake among the shock cases was a fairly advanced abdominal pregnancy which was thought to be a ruptured uterus. The figures take into account only ectopics which were wrongly diagnosed. If the cases diagnosed as ectopics which proved to be something else were taken into consideration, the total error would be very much higher.

COMMENT

From the foregoing it will be seen that the diagnosis of ectopic pregnancy is still difficult and puzzling in a very large number of cases. Unfortunately, we can expect very little except negative help from the laboratory. A correct diagnosis depends on complete and accurate history combined with proper interpretation of all clinical data. Perhaps most ectopics are overlooked during their early stage because the attendant had his mind fixed on the more common conditions and did not think of the possibility of ectopic. At times,

too, the first impression is ectopic, but owing to the confusion of symptoms, or fixing the attention on one phase, or overcaution engendered by a few mistakes in the past, the diagnosis is incorrectly made.

CONCLUSIONS

- 1. In a majority of cases a preceding period of unusual infertility was not demonstrated.
- 2. A previous history of severe inflammatory pelvic disease was seldom reported.
- 3. History of previous pregnancies closely approximates that of the married population of this age group.
- 4. A large incidence of previous operations on the uterus and adnexae was revealed.
- 5. Predominant type of abdominal pain is irregular, lancinating or colicky, and subject to remissions.
 - 6. Vaginal bleeding is most frequently irregular and scanty.
- 7. Actual fainting or its minor manifestation of sudden weakness was present in at least 57 per cent of the cases. This symptom is almost pathognomonic and, in relation to type of abdominal pain and vaginal bleeding, will establish a diagnosis in the largest number of cases.
- 8. Except in the presence of infection or recent hemorrhage, temperature, pulse, blood pressure, blood count, and sedimentation time are approximately normal.
- 9. A closer scrutiny of the alleged last menstruation will often reveal an anomaly which may clarify the diagnosis.
- 10. More reliance may be placed on the history than on physical examination.

515 PARK AVENUE.

(For discussion, see page 439.)

Pastiels: Dystocia Due to an Ovarian Cyst. Suprapubic Cesarean Section Followed by Oophorectomy. Bruxelles-med. 8: 175, 1927.

Pastiels reports in full a case of mucoid cyst of the left ovary discovered during the sixth month of pregnancy. The patient was kept under close observation. After two hours of labor the head had not engaged and the cyst was presenting in the pelvis. A low cesarean section followed by left oophorectomy was therefore done. The child was normal and the mother made an uneventful recovery.

In 278 cases reported in literature where the cyst was within the pelvis, Puech and Vauvert ascertained dystocia in 262. These authors also feel that the earlier in pregnancy the cyst is removed the less is the chance of spontaneous abortion. Pastiels, therefore, advocates operative removal before the third month. After this time he intervenes only in case of emergency, letting the patient go to term and doing a cesarean section and oophorectomy at that time if circumstances warrant this procedure.

Theodore W. Adams.

MATERNAL MORTALITY IN 582 ABDOMINAL CESAREAN SECTIONS*

(From the New York Nursery and Child's Hospital)

BY E. M. HAWKS, M.D., NEW YORK CITY

THE maternal mortality of cesarean section has been much discussed in the last few years. It is high and the reasons are being sought. The problem is not alone that the rate is high but rather that there are too many deaths due to cesarean section. Analyses of complete groups of cases are, therefore, in order, and this report is a review of the deaths following the abdominal cesarean sections done at The New York Nursery and Child's Hospital during the years from 1910 to 1928, inclusive. This period covers the work of the hospital as it is now organized. The private cases are included and acknowledgment of this privilege is hereby made.

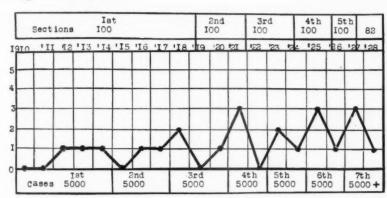


Fig. 1.-Number of deaths yearly.

This series is of particular interest because the operations have been done by so many men. Nearly all the obstetric groups in New York City are represented. There were 83 operators and 37 of them have been, or are, members of this Society.

The following topics will be considered:

First: The number of deaths, the rate, and the part of the total mortality formed by these deaths.

Second: The incidence and its bearing on the mortality.

Third: The causes of death.

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Fourth: Variety and choice of type of operation.

There were 22 deaths, distributed according to years as shown in Fig. 1. An increase is noted. There were 7 deaths in the first half of the time and 15 in the second. This picture is probably typical of what

^{*}Read at a meeting of the New York Obstetrical Society, March 12, 1929.

is happening in many hospitals throughout the country. The number of cesarean sections has been greater and there have been more cases as the years have passed, but the deaths have increased in number slightly faster than have the cases.

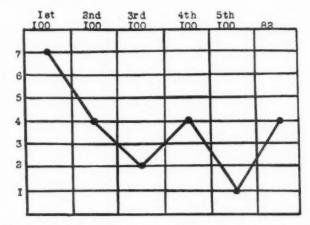


Fig. 2.—Death rate of cesarean section per groups of 100 cases.

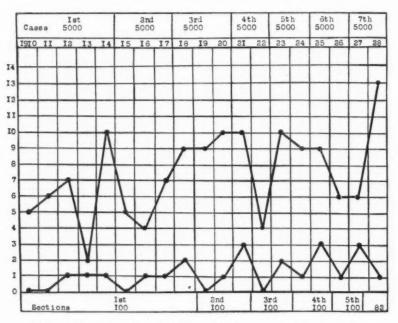


Fig. 3.-Total mortality and that from cesarean section by years.

The total death rate was 3.6 per cent, as shown in Fig. 2 in groups of 100 cesarean sections.

Figs. 3, 4, and 5 show the part of the total mortality formed by deaths following section. Fig. 3 shows both mortalities according to years. There was a total maternal mortality, uncorrected, of 141 in

35,677 cases. This is a percentage of 0.4 or 40 per 10,000. Section was a factor in 6+ deaths. Fig. 4 shows more clearly the trends of these mortalities as the cases are arranged in large groups of 5000. Deaths

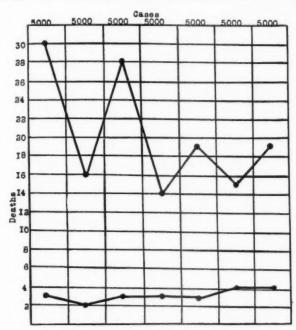


Fig. 4.—Total mortality following cesarean section.

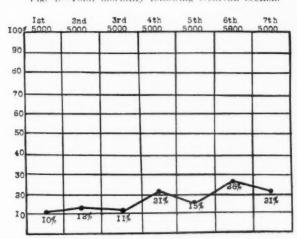


Fig. 5.—Shows the percentage that the deaths from cesarean section formed of the total mortality.

from section are seen to form a larger part of the total mortality as the years pass. Fig. 5 shows, in percentages, the part of the total mortality, in groups of 5000 cases, formed by deaths after cesarean section. The percentage rose from 10 per cent to 26 per cent and in the last

group dropped to 21 per cent. The average was 16 per cent. It may be said that this percentage is high because the total mortality is low. If a patient died in the years 1910 to 1914 there was one chance in ten of her having died after cesarean section. In 1927 or 1928 there was one chance in five of cesarean section having been a factor in her death.

INCIDENCE

Table I gives a complete statement of the incidence of cesarean section for the nineteen years. The number of cases, the cesarean sections with the percentage and rate of incidence, the deaths from cesarean section, and also the number of primary and repeated cesarean sections

TABLE I. SHOWING NUMBER OF CESAREAN SECTIONS IN EACH YEAR, AND DEATHS FOLLOWING CESAREAN SECTION FOR EACH YEAR

		TOTAL						REPEATED	PRIMARY
		CESAREAN	PER					CESAREAN	CESAREAN
YEAR	CASES	SECTIONS	CENT		RAT	E	DEATHS	SECTIONS	SECTIONS
1910	913	3	0.3	1	in	300	0	0	3
1911	557	1	0.2	1	in	500	()	1	0
1912	1080	65	0.6	1	in	160	1	0	6
1913	1169	3	0.3	1	in	300	1	0	3
1914	1238	9	0.7	1	in	140	1	1	8
1915	1529	8	0.5	1	in	200	0	1	7
1916	1541	10	0.6	1	in	160	1	0	10
1917	1849	19	1.0	1	in	100	•)	2	17
1918	2256	23	1.0	1	in	100	0	1	22
1919	2003	37	1.8	1	in	55	0	5	32
1920	2386	36	1.5	1	in	66	1	7	29
1921	2300	47	2.0	1	in	50	- 68	10	37
1922	2395	39	1.6	- 1	in	62	()	4	35
1923	3005	3.7	1.2	1	in	80	0	5	30
1924	2277	61	2.7	1	in	37	1	12	49
1925	2227	51	2.3	1	in	43	3	12	39
1926	2198	71	3.2	1	in	31	1	19	52
1927	2399	64	2.7	1	in	37	3	16	48
1928	2355	59	2.5	1	in	40	1	18	41
19 years	35677	582	1.6%	1	in	62	22 (3.	6%) 114	468

for each year are given. The rate of incidence for the whole number of cases as 1 in 62, or 16 per thousand, or 1.6 per cent. The rate for the primary cesarean section was 1 in 80, or 13 per thousand, or 1.3 per cent.

The incidence is seen better graphically in Fig. 6. It is arranged so that the rate per thousand each year is given. There is a rapid rise from 3 and 2 per thousand in the beginning to 32 per thousand in 1926 and a fall in 1927 and 1928 to 25 per thousand.

Fig. 7 shows a smoother curve of the incidence as it is based on groups of 5000 cases. The broken line is the curve of the primary cesarean sections. The upper line is the curve of the total incidence. The space between the two lines represents the repeated cesarean sections. This space is seen to be steadily increasing. The rise in the curves is due, no doubt, to the surgical solution of the difficult cases.

The indications have been widened as the ease and safety of surgery have been realized. This picture, also, is probably common to most hospitals. The decrease in the incidence seems to be due to better trial labor and to improved means of vaginal delivery. The obstetrician has felt a sense of security in the newer types of cesarean section. He has consequently allowed the cases to go to full dilatation and to have much better trial labors. He has been able to meet the situation of possible infection without fear if cesarean section has been necessary. Rectal analgesia has been very helpful in getting full dilatation without loss of the patient's morale. Confidence has been had, also, in the use of mercurochrome during labor. The Barton and the Kiel-

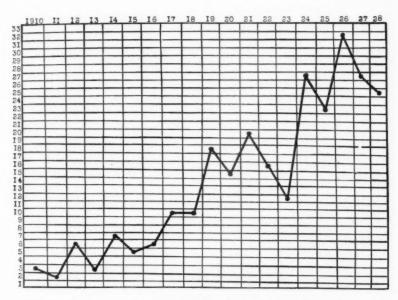


Fig. 6.—Incidence of cesarean section. Rate per year per 1000 cases.

land forceps, as well as better technic in version and extraction, due to Potter's teaching, have improved means of vaginal delivery. They have helped in the deliveries of women who might have been sectioned.

A further analysis of the incidence is seen in Fig. 8. The private and public cases for the past eight years are separated and the incidence per thousand cases in each year is shown for both groups. There were 285 cesarean sections in 7515 private patients. This is an incidence of 3.8 per cent. There were 141 cesarean sections in 11,640 ward patients. This is an incidence of 1.2 per cent. There were ten deaths in the private and four in the ward patients.

The lower curve is probably close to that of the essential incidence for mother and baby. In cases of contracted pelvis or of disproportion, the mothers as a rule had sufficient labor to prove almost positively the

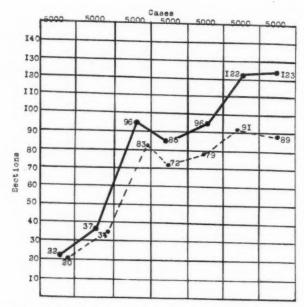


Fig. 7.—Incidence of cesarean section per groups of 5000 cases,

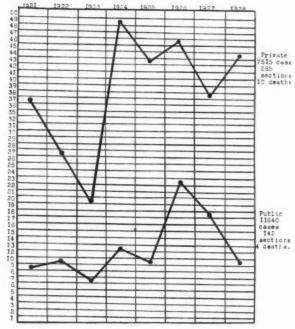


Fig. 8.—Incidence of cesarean section in private and public cases. The rate per 1000 cases per year is shown.

necessity of cesarean section. Other indications had the scrutiny and discussion of the ward service. There were no eraniotomies on normal living babies.

The chief reason for the higher course of the upper curve has been the arbitrary choice of cesarean section in the private case. It is doubtful whether there has been a higher percentage of abnormal cases in the private service. Some capable obstetricians have deliberately chosen section in preference to the vaginal delivery in their debatable eases. The anxiety about the private case has played a part in this choice. Other men who have had more experience in abdominal surgery than in obstetrics have also followed the line of least resistance

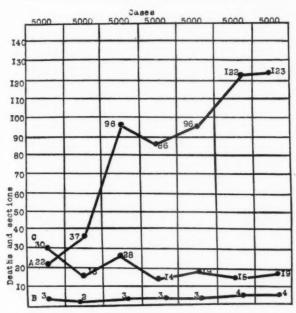


Fig. 9.—Relationship between incidence (A) and the mortality following cesarean section (B), and the total mortality (C).

and have done cesarean sections on many of their patients. Consultations do not always safeguard as they are often merely politely agreeable. This curve, then, may indicate an arbitrary incidence as opposed to an essential one.

This arbitrary or high incidence may be the result of the judgment of good obstetricians or of the demand of the parents for the safety of their babies, but it is one of the causes of the rising maternal mortality about which we are concerned. When cesarean section is chosen the consequences should be remembered. The first result is more deaths from one cause or another. We have seen in this last chart that there were 10 deaths from cesarean section in 7515 private patients and 4 in 11,640 ward patients. Then there is the aftermath of danger of rupture of the uterus in the succeeding pregnancy, danger from the in-

creased rate of mortality of the repeated section, and also the dangers associated with ventral hernia, adhesions, and with therapeutic abortion. Finally there is the end-result of disturbed marital relation and limited productivity.

The relationship between incidence and mortality in this series of eases is seen in Fig. 9. The mortality following cesarean section has not, as a matter of fact, been affected very much by the rapid rise in the incidence. It has been increased by only one in each of the last two groups of 5000 patients or two in 10,000. The complications and sequelae have not been estimated. It seems even fair to ascribe some of the lowering of the total mortality to the increase in the incidence of cesarean section. Other factors, of course, have been prenatal care, improvement in prevention, and in the treatment of infection, and transfusion. In the first 5000 cases there were 22 cesarean sections and 30 deaths from all causes, while in the last 5000 cases there were 123 sections and 19 deaths from all causes. Among the indications for the 123 cesarean sections there were 66 in the interest of the mothers, including 34 repeated cesarean sections. The best results were in the fourth group of 5000 in which there were 86 cesarean sections with a total of 14 deaths from all causes including the 3 deaths from the cesarean sections.

CAUSES OF DEATHS

The causes of the deaths, arranged chronologically, following cesarean section are shown in Table II. It seems safe to say that a lowering of the mortality following section may be expected in the future. Deaths from cesarean section in eclampsia are becoming rare. The last in this series was seven years ago. This indication is being eliminated by better prenatal care and by a change in the method of treatment. The deaths from shock, and from hemorrhage and shock, may occur again but with better general or local anesthesia and with the modern use of transfusion, they will be few. Pneumonia, too, should be less frequent. Improved anesthesia and present day precautions will cut down its incidence. We were fortunate in not having more deaths in bad cardiac cases. These cases are being studied more carefully now in a special cardiac clinic.

Paralytic ileus has been common to a greater or less degree in the classical cesarean sections but this type of operation is being limited more and more to the clean cases, and we may expect less ileus. It is seen less often anyway on account of better pre- and postoperative care. The case of antepartum intestinal obstruction was a rarity and was well advanced on admission. The patient was at term and cesarean section was done. Surgical treatment of the obstruction failed.

The two cases of tuberculous meningitis, associated with spinal anesthesia, were startling. The death from postoperative hemorrhage shows

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the danger of additional work in cases of cesarean section. Autopsy showed that the bleeding came from an injury to a large vein in the broad ligament following salpingo-oophorectomy. The death after transfusion was very puzzling. The cesarean section was done for placenta previa. On the fifth day a transfusion was given. The patient was doing well but the red cell count was low. There was no unfavorable reaction. On the seventh day another transfusion was given as an additional boost. The patient had a chill, became eyanotic, and died in coma three hours later. There were no untoward symptoms during the transfusion. The blood was retyped before the transfusion and postmortem. There were 4 deaths in the group of repeated cesarean sections. In the last 6 deaths cesarean section may be exonerated from directly causing the fatalities. There was only one death from septicemia. Possibly there may be more such deaths in a second group of cases as large as this one. There were 7 deaths from peritonitis in the contaminated cases. It should be noted that the last such death oc-

TABLE II

		INDICATION	CAUSES OF DEATH
1	1912	9	Shock
2	1912	Eelampsia	Died after 7 hours: Eclampsia
3	1914	Cervical dystocia. Bagged twice.	1
		Labor three days	Peritonitis, 3 days
4	1916	Eclampsia	Shock, 7 hours
5	1917	Contracted pelvis	Peritonitis, 4 days
6	1918	Contracted pelvis, bagged	Septicemia, 10 days
7	1918	Dystocia due to amputation of	
		cervix. Labor 60 hours	Peritonitis, 3 days
8	1920	Preeclamptic toxemia	Pneumonia
1)	1921	Cardiac, decompensated	Died after 22 hours
10	1921	Eelampsia	Eclampsia, 20 hours
11	1921	Rigid cervix	Peritonitis, 3 days
12	1923	Preeclamptic toxemia	Paralytic ileus, 4 days
13	1923	Contracted pelvis, previous sec-	,,,
		tion	Hemorrhage, shock, 3 hours
14	1924	Rigid cervix, labor 30 hours	Peritonitis, 4 days
15	1925	Premature rupture of membranes,	,, -
		contracted pelvis, labor 24 hrs.	Peritonitis, 4 days
16	1925	Induction of labor, bagged twice, membranes ruptured arti- ficially, weak pains 48 hours. Temp. 103.4°	Peritonitis, 4 days
17	1925	Intestinal obstruction, ante-	remonitis, 4 days
		partum	Intestinal obstruction
18	1926	Previous cesarean section	Pneumonia
19	1927	Contracted pelvis, cervical dysto-	Tuberculous meningitis, spinal
20	1927	Contracted pelvis, previous sec-	Tuberculous meningitis, spina anesthesia
21	1927	Previous section, salpingo-	
		oophorectomy	Postoperative hemorrhage
22	1928	Placenta previa	Died on 7th day, in coma 2 hours after second transfusion Cerebral embolism or anaphy lactic death

curred in 1925, or three years ago. The newer types of cesarean section will cut these deaths down in the future as has already been the case.

These contaminated cases with disproportion or cervical dystocial have formed a dangerous and difficult group. They have been the predisposing cause for almost one-third of the deaths. The choice has had to be made between almost hopeless deliveries or craniotomies with their consequences and cesarean sections with the danger of peritonitis. This decision has not been an easy one to make.

These cases have sounded the death knell of the classical cesarean section in the contaminated patient. It is true that the classical operation has been successful in many of them but the death rate has been high. An experienced and skillful operator may have good results. Each man knows his own work and knows how he can best handle a given problem. He should, however, be alive to improvement. In the classical operation an operator may succeed in protecting the peritoneal cavity from the initial spill but there is still danger from the secondary leakage or extension of infection from the uterus and, as a rule, no provision for its control. Some men have drained the peritoneal cavity to advantage in these cases.

VARIETY OF SECTIONS

Operations have been devised to avoid the dangers of initial spill and secondary leakage. Some have been abandoned as others more practical have appeared. Table III shows the variety of sections that have been used in this series of cases. It also gives the years in which the different kinds have been in use. From 1910 to 1922 there were only the classical and the Porro. The low flap operation was introduced in 1922.

TABLE III. VARIETY OF SECTIONS

Classical. The Intraperitoneal Method.

Sanger's Operation.
High, mid, and low types.

Porro. Hysterectomy.

1922 Low Flap or Two Flap. A cervical cesarean section Kronig's Operation. Modified by Beck.
Laparotrachelotomy of DeLee.

1923 Extraperitoneal Method.
Latzko's Operation.

1924 Transperitoneal Method.

Fromme-Veit Operation.
Hirst Operation.
Modified by Brodhead, Langrock, and Cassasa and known as the peritoneal exclusion.

Table IV shows the number of cesarean sections done according to each type of operation and the number of deaths after each kind. It is seen that most of the cesarean sections have been classical and that all but one death have occurred in this variety. It will also be seen that 79 eases, mostly contaminated, have been done according to the newer types of operation and that no death has occurred.

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TABLE IV. CESAREAN SECTIONS AND DEATHS ACCORDING TO TYPE OF OPERATION

	NO.	DEATHS
Classical	492	21
Porro	11	1
Low Flap	30	0
Latzko	30	0
Peritoneal exclusion	19	0

CHOICE OF TYPE OF OPERATION

We have been fortunate at the New York Nursery and Child's Hospital in having been able to observe the methods of many operators. We have not adopted any one operation exclusively, believing that each has its place. We feel that at present the obstetric surgeon is able to choose a type of operation to fit his case. There are 5 forms of cesarean section from which he may pick. As in any surgical problem variations in conditions determine selection of type of operative procedure when several methods are available. So it would seem to be with cesarean section, for there is not much doubt that the operation suitable for a clean case is not the choice for a contaminated one. During the past few years other forms of cesarean section than the classical have been used in most of the contaminated cases. Some of the men have done the low flap exclusively, others the peritoneal exclusion, a few the Latzko, and others have done all forms as they have seen fit. This last viewpoint I wish to emphasize.

There has not been a death from peritonitis in the last 212 cesarean sections. All chances have been accepted as no craniotomies on normal living babies have been done. This is strong evidence of the value of the newer types of cesarean section in the contaminated cases. Some deaths from septicemia are bound to happen. The cesarean sections aim only at preventing peritonitis by controlling the initial spill and the later leakage from the uterine wound. They cannot prevent thrombophlebitis or infections from the uterus except inasmuch as they terminate labor. There may be anatomic hazards and technical difficulties involved but they are not to be compared with the risk of peritonitis.

There is no doubt that a combination of essential incidence, good choice of type of cesarean section, good operative technic and proper anesthesia will give the minimum mortality. If a man be inexperienced in the newer types of cesarean section it would be better for him to

operate early in labor. That means higher incidence with its consequences. Some men emphasize the importance of early operation but this should be second choice. There will always be contaminated cases and the obstetrician should fit himself to handle them properly.

In the selection of the type of cesarean section the classical operation is reserved for the elective case, i.e., the woman not in labor. It is useful when speed is essential, as in a case of accidental hemorrhage with little dilatation and mother and baby in danger. It may be easiest in a cardiac case or the choice in a clean case of placenta previa.

The other types are used in the potentially infected cases, although some of the operators have done the low flap operation in the clean and elective cases also. The choice is made usually according to the sup-

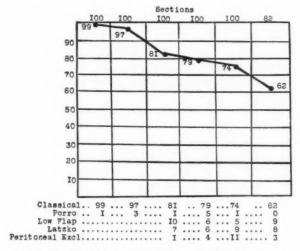


Fig. 10.—Declining curve of the classical operation.

posed degree of contamination in the order of first, low flap; second, peritoneal exclusion; third, Latzko; fourth, Porro.

Thus the low flap operation is done in a case in early or later labor with little or no contamination. Fourteen of the cases which had the low flap operation had had no labor. The average duration of labor in the remaining 16 was fifteen and one-half hours. The labor varied from three to forty hours. Four lasted twenty-four hours or longer. With local anesthesia and with the technic of Beck or DeLee this may prove to be the universal cesarean section.

The method of peritoneal exclusion is chosen in contaminated cases with suspected infection of the amniotic fluid. The initial spill or later leakage from the uterus is considered dangerous. The operation is particularly adapted to a case in which there is likely to be very little retraction of the lower uterine segment. This operation has the advantage of affording drainage if thought necessary. Four of the 19 pa-

tients on whom this operation was done had no labor. One of the 4 had ruptured membranes for three days. In the remaining 15, labor averaged twenty-six hours. The variation was from twelve to fifty-five hours. Eight were twenty-four hours or longer. Its simplicity recommends this operation. The technic described by Brodhead, Langrock, and Cassasa is the more preferred. So far it has given very good results in these rather badly contaminated cases.

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The Latzko operation is the selection for the contaminated case long in labor and with the lower uterine segment well drawn up. There may have been much manipulation or possibly ineffectual attempts at delivery from below. This operation also has the advantage of drainage. The patients upon whom this operation was done had all been in labor. The variation was from eight to seventy-two hours. The average was twenty-nine hours. Nineteen had been in labor for twenty-four hours or longer. In the 30 operations of this type the bladder was injured four times. No fistulas resulted. The peritoneal cavity was opened 11 times. It was closed, however, before the uterus was incised.

There is no competition, in our opinion, between the low flap, peritoneal exclusion and Latzko operations, unless the low flap is used in the badly contaminated eases. In this group the peritoneal exclusion or Latzko is considered safer because of better protection of the peritoneal eavity and drainage. If the lower uterine segment is thought to be well retracted the Latzko operation is chosen, otherwise the peritoneal exclusion.

The Porro operation is the old choice for the badly contaminated case with a noncontractile, grossly infected uterus. It is also used in cases of uncontrollable hemorrhage, apoplectic uterus, nonremovable tumors, placenta accreta, and usually in cases of ruptured uterus. It was done only twice for infection in this series of cases.

SUMMARY

In 582 abdominal cesarean sections done in a single hospital by a large number of obstetricians during the past nineteen years, there were 22 deaths (3.6 per cent).

These deaths formed 16 per cent of the total obstetric mortality.

The average incidence was 1.6 per cent. In sixteen years it rose from 0.2 per cent to 3.2 per cent. In the last two years it has dropped to 2.5 per cent.

The mortality following cesarean section increased two in ten thousand deliveries. Section has been a factor in the reduction of the total mortality.

Peritonitis was the chief cause of death. It has been eliminated in the last three years by the use of the newer types of cesarean section.

Our faults have been high incidence and a lack of the proper selection of type of cesarean section in the contaminated cases. In the last

few years a better choice of operation has kept our mortality down in spite of the rise in the incidence of cesarean section.

These faults, high incidence and poor selection of type of cesarean section, are probably more or less common and doubtless largely account for the widespread high mortality following cesarean section.

The remedy, of course, is education of both the public and ourselves. It should be shown that cesarean section is not the simple, safe solution of the difficult labor that it is thought to be. We should equip ourselves well with obstetric surgery, both of the abdominal and vaginal varieties.

11 EAST FORTY-EIGHTH STREET.

(For discussion, see page 436.)

THE USE OF SODIUM ISO-AMYLETHYL BARBITURATE (SODIUM AMYTAL) IN OBSTETRICS*

By A. R. Robbins, M.D., J. T. C. McCallum, M.D., A. M. Mendenhall, M.D., and L. G. Zerfas, M.D., Indianapolis, Ind.

(From the Medical Research Department of the Indianapo'is City Hospital and the Department of Obstetrics of the Indiana University Medical School)

THE effort to alleviate pain by various procedures is about as old as civilization. The attempt to obtain painless childbirth has met with varying degrees of success. The barbituric acid derivatives have been used to a limited extent in obstetric practice in the United States but rather extensively in foreign countries to produce analgesia and surgical anesthesia.

In France, Fredet and Perlais¹ used allyl-isopropyl barbiturate (somnifene) to produce surgical anesthesia. A few years later, in Germany, Bumm² used a brompropyl-phenyl replacement barbiturate, called pernokton, for the same purpose. L. Cleisz,³ a Frenchman, who used somnifene (diethyl-allyl-iso-propyl-barbiturate of diethylamine) intravenously to abolish pain during labor, has reported 40 cases. Some work of this nature was done as early as 1923 in France. Cleisz administered a dose intravenously at two to three fingers' cervical dilatation and obtained perfect anesthesia for a period of ten hours. In his cases, he added pituitrin and used forceps to artificially shorten labor. In his conclusions he makes the statement that he considers it superior to any other form of obstetric anesthesia.

F. Delmas and A. Roume, in their investigations, came to conclusions different from those of L. Cleisz. They used somnifene intramuseularly and intravenously in labor and were of the opinion: (1) that the child was sleepy and unable to nurse for several days following delivery; (2) that the restlessness of the mother was often extreme before, during, and following delivery; (3) that the mother slept several days; and (4) that the progress of labor was markedly impaired. They advised that the drug be employed circumspectly, confining it to hospital use.

^{*}Received for publication, June 1, 1929.

EXPERIMENTAL WORK

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d. al Sodium iso-amylethyl barbiturate has been used extensively for the production of surgical anesthesia in animals.⁵

Page and Coryllos⁶ found that the average minimum effective anesthetic dose in dogs was about 35 mg. per kilogram when given intravenously. Eddy⁷ has shown that, in order to produce anesthesia in cats, 50 to 60 per cent of the lethal dose was required when administered orally and that the average fatal dose was approximately 100 mg. per kilogram of body weight. Swanson⁸ found that in the routine intravenous administration of this salt for the production of anesthesia in animals (rabbits, cats, and dogs) a dose of 45 to 60 mg. per kilogram was necessary for operative procedures. Lundy and Osterberg⁹ found amytal to be three times the strength of veronal, and Tatum and Parsons¹⁰ found it the best barbiturate to use if survival of the animal was desired.

Sodium amytal was first used intravenously as a general anesthetic in humans in 1928 by McCallum; 11 he also found it was of value in the treatment of asthma, delirium tremens, and convulsions from various causes.

Zerfas and McCallum¹¹ observed that examinations of the urine, following the administration of the drug, were essentially negative except for excessive amounts of urates for twenty-four hours postoperatively. The CO₂ combining power showed no appreciable change during the anesthetic state. A slight drop in nonprotein nitrogen occurred for a day or two postoperatively but within normal limits. The blood sugar levels showed a tendency to increase, but rarely exceeded the maximum normal limit unless there was a previous metabolic disturbance.

The drug is prepared in a white crystalline form and is sealed in pyrex ampoules. A 10 per cent solution has been found satisfactory for intravenous use. The sterile triple distilled water is mixed with the sodium amytal by gentle agitation, and, as a rule, in one to three minutes a clear solution results. (If the solution is opaque for any reason, it should be discarded.) A freshly prepared solution is desirable; as chemical changes take place rapidly when the drug is dissolved in water, the mixture should not be allowed to stand for any great length of time.

The drug may be given orally, intramuscularly, or intravenously. When used intravenously in 10 per cent solutions, the rate of administration should not exceed one c.c. per minute. The patient drops off into what is apparently a normal sleep after 0.180 to 0.450 gm. (3 to 7 gr.) have been administered. Rarely does any excitement occur during injection of the drug.

The dosage varies according to the patient and the effect desired is based largely upon body weight, although individual variations are common. For surgical anesthesia, doses of from 0.015 to 0.025 gm. ($\frac{1}{4}$ to $\frac{1}{3}$ gr.) have been found satisfactory. For other purposes, 0.003 to 0.012 gm. ($\frac{1}{20}$ to $\frac{1}{5}$ gr.) per kilogram are effective.

IN OBSTETRICS

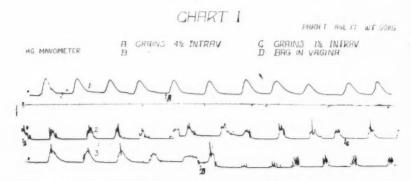
The alleviation and abolition of pain during the progress of labor have been attempted in a multiplicity of ways. This fact alone indicates that success has been variable. Unlike general anesthesia for operative procedures, a theoretically normal labor offers a very real problem in pain alleviation or abolition.

In a parturient woman, two lives are affected, and the active processes of labor must go to completion. Any means used to relieve or abolish the pains of labor must harm neither the mother nor the baby, and it must not interfere with the progress of labor to any appreciable degree.

EFFECT ON MOTHER

Sodium amytal has been used in more than 100 cases in our series. It has been administered in all stages of labor, orally, intramuscularly, intravenously, and rectally. It has been our desire to abolish the pain of labor or at least the remembrance of it.

We found very little slowing, if any, in the progress of labor. We had an apparent temporary delay in 4 cases, the longest being one hour. Uterine powers were impaired little, if any; however, voluntary



powers in the first stages of labor were markedly diminished and the patient, at times, was unresponsive to uterine contraction. Voluntary powers in the second stage may be affected but not to any marked degree and not over thirty minutes. Even in obstetric anesthesia (or deeper) some patients continued powerful expulsive efforts when making no other voluntary move. One patient in the series seemingly had her labor stopped by a small dose of amytal, although she may have been having only false labor pains, or the drug may have been administered too early. Further use of the agent very early in labor will be necessary before conclusions may be drawn.

To measure the effects on uterine contractions, a mercury manometer was connected to a Voorhees' bag inserted in the cervix, and the contractions were recorded. Doses up to 0.018 gm. (\frac{1}{3} gr.) per kilogram were given within two hours without affecting the force, duration, or frequency of uterine contractions. (See Charts 1 and 2.)

In 28 normal cases of labor, the average time from the first injection of amytal until the delivery was three hours. The first injection was given when the uterine contractions occurred every four minutes and in in

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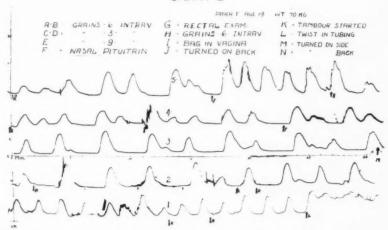
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when the cervix was partially effaced with two to three fingers' dilatation. The average time in a group of 12 primiparae was three and a half hours, while in 16 multiparae, the average time was one hour and fifty minutes. In this group of 28 patients, no patient delivered over six hours after the initial amytal injection. (See Table I.) The other patients who were given sodium amytal in normal labor were not detailed in the table as complete studies were not available.

In 80 patients, one-third showed no undue restlessness, one-third were markedly restless, and one-third were moderately so. (See Tables I and II.) There was no relation, however, between the degree of restlessness and the degree of amnesia. The patients occasionally cried out with labor pains, answered questions, asked for fluids, and yet remembered nothing of the parturition when questioned. Three patients had

CHART I



perfect obstetric anesthesia until immediately after delivery of the baby, at which time they awoke and suddenly regained consciousness.

The restlessness occurred only with pains or because of an uncomfortable position and ceased with completion of the delivery. In the first stage of labor, the patients usually moved or complained with the labor pains and light restraints were necessary. In the expulsive stage it was necessary to restrain the hands to prevent disarrangement of the sterile drapings. The patients occasionally required forcible holding. The incidence and the degree of restlessness were greater when the drug was administered intramuseularly than when it was given intravenously.

No increase in postpartum bleeding was observed, and postpartum pains were probably decreased.

The maternal metabolic changes coincided with those of surgical eases, 11 having no variations outside of the normal limits. Urinary intake and output was in the normal ratio after delivery. The post-partum urine showed no unusual pathology.

THE SPRIES OF CASES CHARTED ARE THOSE IN WHICH COMPLETE OBSERVATIONS WERE MADE UPON NORMAL LABORS. DURA-THON OF LABOR IS NOT INCLUDED AS IT IS UNCERTAIN TABLE I.

CASE NO.	PROGRESS WITH FIRST INJECTION	DILATATION*	EFFACEMENT	TIMET!	DOSE	PARA	PAIN	RESTLESSNESS WITH DELIVER
1	Q‡ 4 min. 60 sec.	11	Partial	0:15	12	VI	Slight	None
01	Q 4 min. 45 sec.	H	Partial	01:5	31/2	11	Marked	Very
20	Caput visible			0:35	9	_	None	Slight
+	Q 4 min. 45 sec.	=	Partial	4:00	151	Ξ	None	Very
10	Q 3 min. 60 sec.	Ξ	Almost	6:00	7 1/2	I	Moderate	Slight
9	Q 3 min. 60 ser.	1V	Complete	1:20	21	_	None	Very
-	Pain in Back	I	None	00:05	7/1+	_	Marked	Awake
×	Q 3 min. 60 sec.	III	Partial	3:30	7.1/2	-	Slight	Slight
c.	Q 2 min. 60 sec.	III	Almost	0:30	12	111	None	Slight
10	Through cervix			0:30	21	-	None	None
27	Q 4 min. 60 sec.	./1	Complete	07:1	141/2		None	None
13		11	S. ight	3:00	22	_	None	Marked
11	Q 3 min. 60 sec.	.11	Complete	2:00	10	-	None	Slight
15	Q 2 min. 60 sec.	III	Almost	0:40	51/2	IV	None	None
16	Q 3 min. 60 sec.	11	Complete	1:20	о.	II	None	Slight
17				N:10	15	11.	None	Moderate
18	Q 3 min. 60 sec.	./-	Complete	0:30	6.	-	None	Moderate
6.1	Caput visible			0:03	712	./1	Sight	None
07	Q 2 min. 60 sec.	.1	Complete	001	Œ	-	Slight	Marked
21	Q 4 min. 60 sec.	./.	Complete	00:3	x	_	Moderate	Slight
01	Q 7 min. 60 sec.	_	None	12:00	001	1	Moderate	None
533	Q 2 min. 60 sec.	./!	Complete	1:00	5/16	III	Slight	Slight
Ť.	Q 10 min. 45 sec.	I	None	5:00	x	I	Slight	Slight
10	(Irreg.)	111	Partial	Oq. 8	2	-	Mediante	5
2.0	S min. on sec.	1111	Lillin	D	0	_	Moderate	OL IN

*S'ated in finiters dilatation of the cervix.

*These patients had nitrous oxide and oxygen for episiotony or repair.

*The fear to fromen and duration of uterine contract.ons.

†From first injection of amytal until delivery.

There was no nausea, vomiting, or headache postpartum. Sleep, when present, varied in length up to six hours although the patient could be aroused for nourishment.

Sodium amytal, administered intravenously, in doses of from 0.003 gm. (½0 gr.) to 0.007 gm. (½0 gr.) per kilogram gave varying degrees of relief, but amnesia was not obtained. Doses of 0.007 gm. (½ gr.) to 0.010 gm. (½ gr.) per kilogram produced amnesia, and larger doses produced obstetric to surgical anesthesia. Women vary extremely in their pain thresholds and in their fortitude thus obviating a uniform dosage.

EFFECT ON BABIES

Fetal heart rates showed an average change of 10, the greatest variation being 30 and the least 5 per minute. The size of the dose bore no relation to the degree of variation. The fetal heart rate varied widely during labor over very short periods of time so that these variations were all within normal limits.

Of 80 babies studied in detail, 3 were asphyxiated, and breathing was started with more or less difficulty; 2 were apneic, while the remainder breathed spontaneously or with slight stimulation. (See Table II.) Their cries were forceful and no undue signs of depression were evident. One premature (seven and one-half months) baby was delivered, whose regular breathing started in three minutes. The mother was an eclamptic whose convulsions had been controlled for twelve hours with $48\frac{1}{2}$ gr. of amytal given intravenously. (The last 15 grains were given for the operation.)

The average loss of weight in 30 babies was 9 ounces. The average time during which this loss occurred was three and five-tenths days. The average time in regaining their birth weights was eight and five-tenths days. (See Table II.) Four babies lost more than 12 ounces, 3 being forceps deliveries of primiparae. In our series of completely studied cases, one full-term baby, viable before delivery, was stillborn. No definite cause for the death was ascertained although it may have been due to an occult prolapsed cord.

* * * *

The intravenous injection of sodium amytal produced a marked sedative and analgesic effect beginning before completion of the injection and reaching its maximum in fifteen minutes. An intramuscular dose was approximately two-thirds as effective as a like intravenous one, was much slower in action, but was of longer duration. At the end of one hour, the intravenous effect began to wane. The intramuscular injection produced an effect in ten to fifteen minutes which reached its maximum in forty-five minutes and which began to wane after two hours. The dose was repeated as indicated. Pulses and blood pressures showed only variations consistent with normal labor and sleep.

OF THE SERIES OF CASES CHARTED ARE THOSE WHICH COMPLETE OBSERVATIONS WERE MADE UPON NORMAL LABORS. DURATION LABOR IS NOT INCLUDED AS IT IS UNCERTAIN TABLE II.

CASE	2	WT. IN	PARA	DOSE	TIME	AMOUNT	AMNESIA	RESTLESS-	TYPE OF	CONDITION	INFANT	WT.	210	DAY
NO.	AGE	KG.		(GRAINS)	DELIVERY* HR, MIN.	OF PAIN	de care de de care de care	NESS	DELIVERY	DELIVERY	LB. 0Z.	(0Z.)	D.A.I	GAINE
1	30	80	VII	19		Slight	Partial	None	L.O.A. Spon.		21	555	r.	19
ಣ	18	20	I	9		None	Complete	Marked	LOA. Snon.		1	0	15	1
+	000	70	III	15		None	Complete	Marked	LOA Spon		. [-	-	7	11
10	18	09	Ι	7		Moderate	Partial	Slight	ROA Snon		2	. 7	. 0	1 10
9	17	55	—	12	1:20	None	Complete	Marked	L.O.A. Spon.		7	1) (1)	2 00
13	21	09	Ι	18		None	Complete	Marked	L.O.A. Spon.		1	19	0 00	+
14	15	20	I	10	5:00	None	Complete	Slight	LOA Snon		1.7	2	0.00	
15	67	20	IV	10	0:40	None	Complete	None	L.O.A. Spon.		6	10	7	- 00
16	C3	09	П	0.		None	Complete	Slight	L.O.A. Spon.		6 -6	61	7	01
17	401	20	IV	15		None	Complete	Moderate	L.O.A. Spon.		7-13	4	900	£-
18	63 00	09	Λ	6		None	Complete	Moderate	R.O.P. Spon.		7-13		00	. &
19	21	09	Λ I	0,		Slight	Partial	None	L.O.A. Spon.		6 -2	15	್ಯಾ	9
07	19	09	-	00 H01	5:20	Slight	Partial	Marked	L.O.A. Spon.	Crying	x	+	200	1-
21	54	55	I	00	5:00	Moderate	Partial	Slight	L.O.A. Snon		9 -9	x	4	9
000	00	1		0.00					SC.L.A.		1-1	c.	ಣ	6.
21 6	30	09	-	50	_	None	Complete	None	L.O.A. Forceps		9- 1	14	-	13
53	21	09	Ξ	0.2	1:00	Slight	Partial	Slight	R.O.P. Spon.		7- 3	65	00	9
52	100	09	Ι	c1		Moderate	Partial	Slight	L.O.A. Foreens		7-11	10	G.	10
95	17	50	Ι	103	5:00	None	Complete	Slight	LO.A. Snon.		5-13	10	1 00	3 6
127	16	90	_	19		None	Complete	Moderate	L.O.A. Spon.		9- 7	06	-	- 00
00	19	09	I	16		None	Complete	Slight	L.O.A. Spon.		6-11	1	4 4	13
667	17	20	_	103		None	Complete	Marked	LOA Spon		6-6	0	0	9
30	14	09	_	11		Slight	Partial	Moderate	LOA Spon	_		10	110	10
31	24	65	I	6	0:15	None	Complete	Slight	LOA. Snon.	_	01-10	4	4	1
32	30	22	I	14		None	Complete	None	R.O.P. Spon	_	2 - 8	. 9		- O.
33	19	20	Ι	25		None	Complete	Slight	L.O.A. Foreens	_	000	0	1 10	+
34	35	06	III	191	0	None	Complete	None	LO.A. Snon	-	6 4	1	i k	2

*From first injections of amytal until delivery.
**These patients had niltons oxide and oxygen for episiotomy or repair.
†Cases whick, *ad not regained birth weight on release.

ROBBINS, ET AL.: SODIUM ISO-AMYLETHYL BARBITURATE IN OBSTETRICS 413

IN ECLAMPSIA

In eclampsia this drug offers immediate control of convulsions. Eight eclamptic convulsion cases have been treated and in every instance the convulsions were immediately controlled.

CASE REPORTS

One case, a primipara, aged eighteen, continued to have convulsions for one and one-half hours after having received one-half grain of morphine. Further convulsions, however, were controlled by moderate doses of sodium amytal. Two hours later a stillborn female was delivered by forceps. Two hours postpartum this patient had another convulsion; amytal was administered, and an uneventful recovery occurred.

The second case was that of a patient who was having convulsions in rapid sequence. Six grains of sodium amytal controlled them. The patient died three hours later, and the postmortem examination showed a beginning lobar pneumonia.

The third patient had three convulsions in an hour. Eleven grains of sodium amytal were administered and no further convulsions ocurred. It was repeated at intervals of an hour or more. Twelve hours following convulsions, a cesarean section was done under 15 gr. of sodium amytal (making a total of 48½ gr. in twelve hours) and a living seven and one-half months' baby was delivered with no undue respiratory depression. No more sodium amytal was given. The patient died of cardiac collapse on the second postoperative day.

The fourth case, a colored primipara, entered the hospital apparently moribund following three convulsions in the home. She showed all the signs and symptoms of eclampsia. Morphine was given and, after two convulsions, 5 gr. of sodium amytal were administered intravenously. She had a slight convulsion two hours later. The intravenous injections were given when she began to be markedly restless. She was given 25 gr. intravenously and 60 gr. intramuscularly over a period of three days until the fear of convulsions was over. Five days later she delivered a dead fetus. Blood pressure during convulsions varied from 178/110 to 140/100. Moderate decreases in blood pressure were observed during the time of injection though shortly after it returned to its previous level. Except for the administration of sodium amytal, the usual treatment was employed. The patient was released after six weeks hospitalization in fair condition, with a blood pressure of 138/70 and with no pathologic urinary findings.

A fifth case of eclampsia, considered by many consultants to be moribund, was treated for five days with the usual methods without favorable results. A cesarean section was done, using sodium amytal intravenously for anesthesia, with an uneventful recovery.

A sixth eelamptic was satisfactorily anesthetized for cesarean section and was delivered of twins, all three patients surviving.

The seventh and eighth cases were postpartum eclamptics whose convulsions were entirely controlled by the use of sodium amytal. Both recovered.

The typical case of eclampsia having convulsive seizures was treated as follows: Sodium amytal 0.500 gm. (7½ gr.) was administered intravenously, which dose was usually sufficient to control the convulsions; some cases, however, required as much as 0.8 gm. (12 gr.) as the initial dose. Four or 5 subsequent doses were given by combined intravenous and intramuscular administration, steadily reducing the intravenous dose. By the sixth dose the administration was usually entirely intra-

muscular. Following the initial dose, 0.5 gm. (7½ gr.) was usually sufficient. The repetition of the drug depended entirely on the restlessness and the recurrence of the convulsions. Careful observation of individual patients may best serve as the guide for their treatment, as no fixed rule relative to dosage or repetition of the injections can be made.

IN CESAREAN SECTIONS

Eleven cesarean sections have been done under sodium amytal anesthesia; in a few instances it was necessary to supplement this anesthesia with nitrous oxide and oxygen. Four patients, a proved nephritic with hypertension, an aortic aneurysm, a toxemia of pregnancy, a precelamptic and a placenta previa in a state of shock, all made uneventful recoveries. An eclamptic in a moribund state, following control of convulsions, died two days postoperative from cardiac collapse.

In each of the 11 cesarean sections, the uterus showed no signs of atony, and contraction took place promptly. In one case, when pituitrin was given, the uterus contracted so firmly that it rendered closure of the incision difficult.

MISCELLANEOUS CASES

Two advanced cases of tuberculosis had labor induced by the hydrostatic bag under sodium amytal anesthesia. Both survived and were later discharged to tuberculosis institutions.

One patient, who was very ill from the effects of a large renal calculus, had labor induced by the bag method under this anesthetic and made a good recovery.

One patient, five days after delivery, was given 15 gr. of sodium amytal intravenously as the only anesthetic for a rib resection for empyema; she made a rapid recovery. Four cases of hysterotomy and sterilization were done under this anesthetic, and the patients all made good recoveries. In 6 patients it was used as the anesthetic in the removal of secundines from the uterus.

Many other minor operations such as episiotomies, perineorrhaphies, dilatations, and curettements, were done under sodium amytal anesthesia. In some instances the dose given was not adequate to produce satisfactory anesthesia so that small amounts of nitrous oxide were required.

DISCUSSION

Analgesia and anesthesia in obstetrics are justly entitled to consideration, and, though this work is new and incomplete, it merits further study. The foreign work done in this field has brought forth conflicting statements with the preponderance favorable to the urea compounds. The variations in their results may be explained on the basis of the instability of the drug in solution with improper buffering. This disadvantage has been largely corrected in the preparation of sodium isoamylethyl barbiturate in its present form.¹⁴

In our cases, the best procedure in the average 125-pound woman was: $\frac{1}{8}$ to $\frac{1}{6}$ gr. of morphine, $\frac{1}{150}$ to $\frac{1}{200}$ gr. of scopolamine and of intramuseular amytal 0.390 to 0.585 gm. (6 to 9 gr.) when contractions

were regular and were occurring in less than ten minute intervals. The injection of sodium amytal was repeated as indicated. An intravenous injection was usually given at the beginning of the second stage in amounts from 0.390 to 0.650 gm. (6 to 10 gr.). It was administered slowly during several pains, stopping when the patient was well controlled. In some instances the patient's arms and legs had to be restrained in order to avoid disarrangement of the draping.

In most of the cases reported in this paper, the intravenous method of administering the drug was used. By this method we were better able to control the dosage and to make accurate observations. Also, the effects of the drug were rapidly obtained.

As a preliminary report, we feel justified in drawing the following conclusions:

(1) The most serious objection to the use of sodium amytal as an analgesic was the difficulty in controlling the patients who became very restless. (2) This drug has the advantage of being rapid in its action and of having a wide range of safe dosage. (3) There has been no evidence of harm to the mother. (4) Labor is probably not delayed. (5) Labor may be rendered practically painless. (6) Obstetric operative procedures are much more easily carried out under ordinary anesthetics when the operation is preceded by sodium amytal. (7) Danger to the baby has not been proved. (8) Prompt and complete control of celamptic convulsions is possible. (9) As a general anesthetic agent for essarean sections and other obstetric operations and especially for patients having tuberculosis or toxemia of pregnancy, sodium amytal bids fair to supplant the inhalation anesthetics.

We are deeply indebted to Doctor H. F. Beckman, Doctor Foster Hudson, Doctor D. L. Smith, Doctor C. O. McCormick, and other members of the Obstetrical Staff of the Indianapolis City Hospital and the Coleman Hospital for Women.

REFERENCES

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⁷²³ HUME-MANSUR BLDG.

CAUDAL ANESTHESIA IN OBSTETRICS

BY JOSEPH W. KELSO, B.S., M.D., OKLAHOMA CITY, OKLA.

WHILE working with Samuel II. Cosgrove at the Jersey City Hospital, Jersey City, New Jersey, on spinal anesthesia in obstetries, I conceived what I felt might be an ideal labor anesthesia. I was interested in normal spontaneous deliveries, and not in operative cases, as we had developed the handling of spinal work to a point of efficiency for abnormal cases where we were extremely pleased with its results when a general anesthesia was contraindicated. My plan was to make free use of morphine and rectal analgesia for the first stage and complete the delivery under caudal anesthesia. I used this method in 34 cases, which is rather a small series, I admit, but large enough to warrant drawing logical conclusions.

The technic of giving a caudal anesthesia to a woman in active labor is of course more difficult than when administered to a thin surgical patient whose mental excitement has been greatly reduced by sedatives. The time of administration was exceedingly difficult to determine, but we tried to give it to the multiparae late in the first stage when we thought delivery would be completed in one hour, and to the primiparae when the cervix was completely dilated and the caput beginning to show. If the patient was placed in the knee-elbow position, she complained bitterly, seemingly due to the weight of the fetus against the pelvic structures. We therefore concluded it was much easier and more satisfactory to give the novocaine with the patient on her side, her thighs flexed on the body, but even then it was technically difficult, on account of her movements during a pain. This was especially so in the case of patients with a tendency toward obesity. In three patients the hiatus could not be found due to excess adipose tissue, in another on account of a deformed sacrum in a rachitic negress.

Of the remaining 30 cases, 15 were successful and 15 failures. This classification was made on a basis of an anesthetic for spontaneous deliveries only. In the 15 successful cases, 7 were primiparae and 8 multiparae. These women I am sure had painless deliveries as far as the birth of the head over the perineum was concerned. However, most of them complained of the abdominal uterine pain which is apparently almost as distressing as the perineal pain. One nineteen-year-old-primipara delivered a six-pound baby and was surprised to know it had been born, having experienced no pain whatsoever. A para ii stated she felt the baby's head being born, but that there was no pain. Another para ii said that having babies would not be such an ordeal if they could all arrive under similar conditions. All patients were very grateful for the relief.

In the 15 unsatisfactory cases 8 were multiparae and 7 primiparae. One multipara was delivered by the intern while I was preparing to give the caudal anesthesia. Another was delivered immediately after the anesthesia had been given. The ten or twelve minutes necessary for the onset of anesthesia had not elapsed in this case. Another para ii stated that she had far more pain with this baby than with her first which was also a spontaneous delivery. I was unable to demonstrate perineal anesthesia in that case. Another primipara obtained absolutely no relief, and no anesthetized area could be demonstrated. In these 2 cases 50 c.c. of ½ per cent novocaine solution was used.

A much greater fault to be found with the anesthesia than the inability to time it correctly, is the inertia it produces. Practically every patient developed some degree of inertia. Out of the 30 cases there were 5 complete inertias. Five more cases had a marked reduction of pain, and of these 8 necessitated forceps for completion of the delivery. Only a few whiffs of ether were necessary in the partial cases and none in the complete inertias except one. This case was allowed to go three hours, and although the inertia still existed, the anesthesia had disappeared some time before. The ratio of lacerations was about the same as our other cases where inhalant anesthesias were used. The two episiotomies and the lacerations were repaired without further anesthesia.

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The toxicity of the drug used is a very noteworthy factor and one to which I had given but little thought at the beginning of these observations. When the injection was made too rapidly, temporary central nervous disturbances were encountered, which manifested themselves by sudden headaches, dizziness, hallucinations, disorientation, and emotional instability. Likewise, the blood pressure and pulse frequently fluctuated, increasing in some and decreasing in others, and not infrequently cardiac pain occurred. Although these disturbances were minimized by very slow injections, they also occurred when no fault in technic could be found. Furthermore, it had a definite toxic effect on Whether this occurred only when used following rectal analgesia and morphine, I am not ready to say. One patient developed a slowing of the fetal heart twenty minutes after the administration. The fetal heart continued to decrease, the fetus became very active and the heart tones were lost. A forceps extraction was done, during which time the mother slept soundly, with the delivery of a stillborn baby. Autopsy failed to show any cause of death. This patient had had a rectal analgesia nine hours before the caudal was given. Another patient, where 60 c.c. of 1/2 per cent novocaine were used, developed a complete inertia and slowing of the fetal heart fifteen minutes after injection. The fetal heart went down to 50, became very irregular and the fetus became very active, but it regained its normal rhythm ten minutes later, following the injection subcutaneously of 3 minims of adrenalin. She had been given analgesia three hours before the caudal. I am unable to explain these two cases in any other way except from toxic absorption. However, I have inquired of others who have used local infiltration of novocaine for cesarean sections, but they can always account for their stillbirths by more definite causes. I saw a decompensated cardiac patient sectioned under local infiltration anesthesia whose baby was never resuscitated, although the heart was good at delivery. The mother had had a great excess of morphine in an attempt to stabilize her heart, which could readily explain the cause of the stillbirth. Dr. Schellekens had one stillbirth out of 6 cases, the one occurring after a prolonged insignificant first stage; the patient was delivered one hour after the injection of 20 c.c. of 2 per cent procaine. However, he did not believe the death was due to the drug.

After making a careful study, the dosage used was altered both in amount and strength from 30 to 60 c.c. of ½ per cent and 1 per cent novocaine, and very little difference was noted. The number of severe inertias was slightly reduced with ½ per cent, but complete ones did occur and the fetus almost expired when this strength was used. The effect was more uncertain with the weaker solutions. We do not believe in the use of pituitrin intrapartum, so the use of this drug to overcome these inertias was not tried. I was interested only in an anesthesia for spontaneous deliveries, per se, and not for operative cases because we had a more certain anesthesia in our intraspinal injection of soluble novocaine crystals when an inhalation anesthesia was contraindicated.

From these 34 cases, where there were four failures to find the hiatus and only half of the remaining cases were successful, the following conclusions may be drawn:

1. The administration of caudal anesthesia in obstetrics is technically difficult and results are not uniform. It should be given only under the strictest precautions and therefore cannot be used in the average home delivery.

2. There is difficulty in timing its administration, since it is often given too late in multiparae and too early in primiparae.

3. Caudal anesthesia produces a certain amount of inertia in practically every case, from a very slight reduction to a complete abolishment of the uterine contractions, necessitating operative deliveries for the completion of the labor.

4. It produces definite toxic manifestations in the mother and, with but little question, is the cause of fetal distress.

5. It does not relieve the pain from the uterine contractions when an inertia does not develop. Since these pains are apparently almost as distressing as the pain from the delivery of the head over the perineum, adequate relief is not obtained for the patient.

6. In the light of these conclusions caudal anesthesia is not satisfactory for spontaneous deliveries.

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A STATISTICAL STUDY OF THE INCIDENCE OF CONTRACTED PELVES IN CHINESE WOMEN AND ITS RELATION TO LABOR AND THE SIZE OF THE NEWBORN

By Susanne R. Parsons, M.D., Los Angeles, Cal.

THIS study of the pelves of Chinese women was undertaken in order to ascertain, if possible, whether the measurements usually accepted as normal for other races, would apply to the Chinese. Accordingly, in a series of 500 women who were delivered spontaneously at the Margaret Williamson Hospital, Shanghai, the pelvis was measured and the data were recorded as to age, parity, presentation, length and weight of the child, and its head measurements. No attempt has been made to use the duration of labor as a factor in this study because of the uniformly unreliable histories obtained. Since the patients were rarely seen before the onset of labor, the pelvic measurements were made at the postpartum examination in maternity, before the discharge from the hospital. The measurements taken were the iliac spines and crests, the trochanters, Baudelocque's diameter, the diagonal conjugate and the transverse diameter of the outlet, and for the sake of uniformity I made all these measurements.

Similar data were recorded in a series of operative cases, but unfortunately the number in which complete data were obtainable is very small (83), on account of the propensity of sick Chinese patients to run away from the hospital before being discharged and the failure of the hospital to prevent this practice.

In spite of a careful search through the literature no adequate measurements of the Chinese pelves were found. Garner³ has measured a number of Chinese pelves but failed to include measurements of the trochanters and diameter of the outlet. As a result she erroneously concludes, "—there are yet few cases of contracted pelves among them." Whitmore⁴ makes the same error. Oppenheim (Fukien¹) gives the average weight of newborn Chinese infants as 3225 gm. for 441 males and as 3094 gm. for 501 females. No lengths or head measurements were given. It seems fair to assume that the pelvic measurements in our series may be taken as a representative average for Chinese women,

since the patients seen at Shanghai are drawn from all parts of China and comprise the larger northerners as well as the smaller southerners.

In this series of 500 spontaneous deliveries the pelvic measurements show the following averages: spines 22.07 cm., crests 26.56 cm., trochanters 29.31 cm., Baudelocque's diameter 18.80 cm., tuber ischii 8.53 cm. In only 159 of the cases was the diagonal conjugate reached and in them it averaged 11.60 cm. In all others it may be assumed to be approximately normal and to measure 12 cm. or more. In other words, the average measurements fall far below the standards regarded as normal for European and American women.

If the classification of Michaelis and Litzmann is taken, except for the funnel pelvis where a distance between the tuber ischii of 8 cm. or less is used (Williams), we find that the cases in our series fall into three main groups, funnel, generally contracted funnel, and generally contracted, as shown in Table I. There was a striking absence of rachitis, and I saw only three definite cases of rachitic pelvis in the course of over 1,500 pelvic examinations.

TABLE I. INCIDENCE OF PELVIC CONTRACTION AND PERCENTAGE OF VARIOUS TYPES
OF CONTRACTION

	SPONTANEOUS	OPERATIVE
Contracted pelves	249, 49.8%	48, 58.5%
Funnel typical	160, 32.0%	25, 30.4%
Generally contracted	60, 12.0%	11, 13.4%
Generally contracted funnel	29, 5.8%	12, 14.6%
PERCENTAGE OF TOTAL NU	MBER OF CONTRACTED	PELVES
Funnel typical	64.25%	52.0%
Generally contracted	24.09%	22.9%
Generally contracted funnel	11.6 %	25.0%

One notes at once the high incidence of contracted pelvis (49.8 per cent) found in 500 women able to deliver themselves spontaneously, and particularly the high incidence of funnel pelvis (32 per cent) in the series, which means that the latter constitutes 64.25 per cent of all contractions encountered. The fact, moreover, that Emmons² reported an incidence of 9.2 per cent funnel pelves among 217 North American Indian squaws is of anthropologic interest as a possible additional point connecting these two races.

Table II shows the comparative frequency of the several types of contracted pelves in the white, black, and Chinese races, the figures for the first two races being taken from Williams and Sun.⁵

From Tables II and III it will be seen that the incidence of contraction among Chinese women is nearly $3\frac{1}{2}$ times as great as among white women in Baltimore and is slightly greater than among black women in that city. The funnel type of contraction occurs 6 times more frequently than among the whites, about 5 times more frequently than

among the blacks, and $3\frac{1}{2}$ times more frequently than among the North American Indians.

The tables also show the preponderant position which the funnel pelvis occupies in Chinese women, in whom it makes up 64.25 per cent of all abnormal pelves, as contrasted with 33.49 per cent and 12.87 per cent respectively in the white and black women of Baltimore. In other words, it more than takes the place of the generally contracted and generally contracted rachitic pelves seen in patients in that city.

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TABLE II. COMPARATIVE FREQUENCY OF DIFFERENT TYPES OF CONTRACTED PELVES ACCORDING TO RACE

PELVES	WHITE (PER CENT)	BLACK (PER CENT)	CHINESE (PER CENT)	N. AM. INDIAN (PER CENT
Generally contracted typical	4.74	16.62	12.0	
Generally contracted funnel	0.64	4.31	5.8	
Funnel typical	5.03	6.44	32.0	9.2
General rachitic	0.52	14.21		
Simple flat	2.43	0.84		
Flat rachitie	0.30	1.02		
Total	13.66	43.44	49.8	9.2

Table III. Percentage of Different Types of Contracted Pelves According to Race

PELVES	WHITE (PER CENT)	BLACK (PER CENT)	CHINESE (PER CENT
Generally contracted typical	35.23	38.80	24.09
Generally contracted funnel	4.75	10.06	11.6
Typical funnel	33.49	12.87	64.25
Generally contracted rachitic	3.82	33.17	
Simple flat	18.07	1.96	
Flat rachitic	2.20	2.37	
Atypical	2.43	0.76	

In order to make our data on pelvic measurements of practical obstetric value, an attempt has been made to correlate it with the data on the size of the newborn. For this purpose the weights of 1000 full-term infants delivered at Margaret Williamson Hospital just prior to my service there, were averaged and found to be 3123.73 gm., or 126.27 gm. less than the average for white infants. The average weight of the newborn infants in my series of 500 cases was somewhat less or 2958.61 gm. It seems this average may be low, since it includes only spontaneously delivered infants.

TABLE IV. LENGTH AND WEIGHT IN THE NEWBORN

	WHITE	BLACK	CHINESE
Length	49.64 cm.	48.75 cm.	50.16 em.
Weight	3316.9 gm.	3104.8 gm.	2958.61 gm.

The average length of the full-term, newborn Chinese infant as obtained from our 500 spontaneous cases is 50.16 cm., as compared to

49.64 cm. for white infants and 48.75 cm. for black infants (Williams) Table IV. Unfortunately no record of the length or head measurements was made in the 1000 cases referred to above. The head measurements of these 500 infants (FO 11.56 cm., MO 13.20 cm., BP 9.16 cm., SOB 9.58 cm., SOB circumference 30.92 cm.) show no striking variations from normal, Table V.

It would appear from Table IV that the average Chinese baby born in Shanghai falls below the usual average, which may account for the relative ease of labor.

TABLE V. HEAD MEASUREMENTS OF NEWBORN

	AVERAGE (CM.)	WHITE (CM.)	BLACK (CM.)	CHINESI (CM.)
FO	11.75	11.71	11.26	11.56
MO	13.5	13.33	13.31	13.20
BP	9.25	9,25	9.05	9.16
SOB	9.5	9.7	9.29	9.58
SOB eire.	32.0			30.92

In view of the fact that among whites and negroes the smaller infants are found in cases of generally contracted pelves and the larger children in typical funnel and simple flat pelves, a modal study of the weights found in each of the three types of contraction encountered among the Chinese was made and is shown in Table VI. It will be seen that in the funnel typical pelvis, 38 per cent of the infants weigh

Table VI. Modal Weights of Newborn Infants Grouped According to Occurrence in Different Types of Pelves

	TOTAL SERIES (PER CENT)	FUNNEL (PER CENT)	GEN. G CONTRACTED (PER CENT)	FUNNEL (PER CENT)
Less than 2500 gm.	9.73	10.0	5.0	0.0
2500 - 2999	31.33	38.1	21.6	20.6
3000 - 3249	22.6	20.6	30.0	37.9
3250 - 3499	19.0	16.8	18.3	13.7
3500 - 3749	9.2	8.7	15.0	17.2
3750 - 3999	6.6	4.3	5.0	10.3
4000 - 4499	1.0	0.0	3.0	0.0
4500 or more	0.05	0.0	1.6	0.0

2500-2999 gm. In the generally contracted typical pelvis, 30 per cent of the infants weigh 3000-3249 gm. In the generally contracted funnel, 37.9 per cent of the infants weigh 3000-3249 gm. In this group also are found more infants between 3500 and 3999 gm. Thus, we see quite the reverse condition obtains in the weights of Chinese infants, i.e., among generally contracted pelves 33.3 per cent weigh 3250-3749 gm., while among the generally contracted funnel 30.9 per cent weigh 3250-3749 gm., and among the funnel pelves 25.5 per cent weigh 3250-3749 gm.

If we admit that the generally contracted pelvis is a stigma of degeneration, and consequently smaller children are born of these women, we are confronted by the fact that either this does not hold true in the Chincse, or these pelves are not true examples of general contraction. In view of the high percentage of contracted pelves occurring in a series of spontaneous deliveries, and the uniformity with which the measurements as a whole fall below the accepted average for whites and the fact that the larger infants occur in the group of generally contracted pelves, it would seem that we are justified in assuming that the normal measurements for a Chinese female pelvis fall below the accepted standard of other races. Therefore this mode should be determined for the guidance of the obstetrician. Further compilation of data on the size of newborn infants, careful pelvic measurements, and type of labor will be necessary, however, before this can be finally established.

In order to establish the part played by age and parity of the mother and presentation of the child in determining the type of labor, a study was made of these factors and the results were what would be expected in any series of obstetric cases. In examining the presentations which occurred in the operative cases, an unusual number of transverse, 18.07 per cent was noted, as well as 8.43 per cent compound presentations.

I am fully aware that this series of eases is small and inadequate as a basis for establishing authoritative data on labor in Chinese women, but it is presented with the hope that even this compilation of measurements may be of assistance to the obstetrician dealing with Chinese patients. It is hoped even more that it may stimulate workers now in China to keep more eareful and complete obstetric records for future compilation and analysis.

SUMMARY

The average pelvic measurements of 500 Chinese women delivered spontaneously in Margaret Williamson Hospital, Shanghai, show that they fall below the usual standards.

In this series 49.8 per cent of the pelves were abnormal, and the typical funnel pelvis accounts for nearly two-thirds of the entire number, while rachitic and simple flat pelvis did not accur.

It is with pleasure that I acknowledge the kindness of Dr. J. Whitridge Williams, Johns Hopkins Hospital, for his invaluable suggestions and criticism of the data here presented.

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2525 DURANT AVENUE.

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ANEMIA IN PREGNANCY

A PRELIMINARY REPORT ON ONE HUNDRED OBSERVED CASES

By John H. Moore, M.D., F.A.C.S., Grand Forks, N. D.

THIS report is based on a study of one hundred pregnant women who consulted me between January 1, 1928, and August 1, 1928. Its purpose was to determine the average hemoglobin percentage and red blood cell count in a group of unselected cases seen consecutively in my private obstetric practice.

No attempt was made to classify these cases as to period of gestation. While the majority came for prenatal care during the first or early second trimester, a number did not appear until well along in the third trimester and one patient was not seen until labor was imminent.

All of these patients were white, in from moderate to good circumstances, and represented a fair cross-section of the childbearing population of this agricultural community.

PROCEDURE

At the first examination each patient's history was taken, and physical and laboratory examinations were made. These included a urinalysis, hemoglobin determination with the Dare hemoglobinometer, red blood cell count, and a blood Wassermann test on every patient. All the hemoglobin determinations were made by the same trained observer and the figure taken was the average of three consecutive readings. This same technician made all the red blood cell counts and the results are shown in the accompanying tables.

TABLE I

NUMBER OF CASES	AVERAGE HG.	AVERAGE R.B.C
100	77.7%	4,140,675

TABLE II

	NUMBER OF CASES	AVERAGE HG.	AVERAGE R.B.C
Primiparae	52	76.8%	4,160,145
Multiparae	48	78.6%	4,121,205

Five patients in this series had nephritis as a complication in pregnancy; 3 were primiparae and 2 were multiparae. The average hemoglobin in this group was 55 per cent, and the average red blood cell count, 3,375,250. It was in this group that the lowest readings were found: There was an octipara with a hemoglobin reading of 35 per

cent and a red blood cell count of 1,520,000. Her case was further complicated by mitral stenosis. This unquestionably hastened her death on the third postpartum day.

Three patients in this series had syphilis. In 2 of them the blood Wassermann reaction was 4-plus and in the third, a primipara with interstitial keratitis, the first reaction was 1-plus but under provocative treatment it became 4-plus. The average hemoglobin for this group was 76.6 per cent and the average red blood cell count was 3,760,000.

One patient, a primipara with mild diabetes mellitus, had a hemoglobin reading of 76 per cent and a red blood cell count of 3,750,000.

For purposes of comparison this series of 100 cases is further divided into hemoglobin groups in Table III.

TABLE III

	50 OR LESS	50-60	60-70	70-80	80-90	90 or above
Number of eases	3	4	12	31	39	11

The maximum hemoglobin reading was 94 per cent and occurred in a multipara. She had a red blood count of 4,900,000.

The maximum red blood cell count of the series, 5,980,000 also occurred in a multipara. She had a hemoglobin reading of 85 per cent.

CONCLUSIONS

- 1. No wide variation exists between multiparae and primiparae in either hemoglobin readings or red blood cell counts in this series.
- 2. The nephritic group showed a substantial reduction in both hemoglobin and red blood cells over the general average.
- 3. The syphilitic group showed a lower average in red blood cells than the average red blood cell count of the series, but with practically no change in the hemoglobin average from that of the entire series.

I am indebted to Mrs. Helen G. Korstad, laboratory technician, for the hemaglobin determinations and red blood cell counts on all the patients in this series.

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ON THE CONTROL OF EPIDEMIC IMPETIGO NEONATORUM BY MEANS OF GLYCERINE

By Ellis Kellert, M.D., Schenectady, N. Y.

(From the Ellis Hospital)

NOMORE annoying condition is encountered by the obstetric departments of hospitals than the occasional invasion of the nursery by impetigo contagiosa.

Several references in the literature show that there is a well established basis for the use of glycerine in treating infection and inhibiting bacterial growth. Since at best it is but mildly antiseptic and requires prolonged contact for favorable effect, glycerine must of necessity have limited applications. My object is to call attention to a simple method for the prevention of a contagious skin disease—impetigo contagiosa.

In February, 1927, our attention was called to the presence of impetigo in the Ellis Hospital nursery. Despite all precautions, isolation, and special nurses, the disease spread from one infant to another. Mercurial ointment and mercurochrome were in constant use but with little influence on the spread of the infection. Invariably more than one bleb developed and in some instances the disease approached a bullous form. The method proposed and apparently used successfully was to anoint the entire body of each infant, after its bath, with a solution consisting of equal parts of glycerine and water.

This procedure is based on the fact that 50 per cent glycerine inhibits the growth of pyogenic cocci and is not irritating to the skin. The thin film of glycerine on the skin appears to retard the growth of bacteria sufficiently to prevent the lesions from developing. No irritation was noted as resulting from the use of the glycerine. The solution of 50 per cent or 60 per cent glycerine should be kept in a stock bottle sterilized by boiling or in the autoclave. In using the solution, it should be poured from the bottle on cotton and daubed over the skin, nails, scalp, etc., following the bath.

When the treatments were begun there were 16 babies in the department, four of which had the disease in varying degrees. Two of the more extensively affected infants were removed from the hospital. The remaining two were sponged daily with the 50 per cent glycerine solution and likewise the 12 normal infants. Of the former no new lesions appeared and of the latter none developed the disease. Apparently the epidemic ceased.

In November, 1927, one infant in the nursery developed characteristic blebs near the right axilla and a diagnosis of impetigo was made. The glycerine method was immediately instituted and kept up for four days, twelve infants being so treated. No further cases developed nor did

the disease spread in the infant affected. This is the first time in recent years that the disease was limited to one patient. During the year 1928 impetigo appeared twice. On each occasion all infants in the nursery were sponged daily for four days with the glycerine and no additional cases developed.

Our experience with the method, while not establishing its value conclusively, is such as to recommend its use in the absence of a more effective method. Even when the water-baths are omitted for a week and glycerine used alone the skin is less irritated, more supple and healthier appearing than under the usual nursery routine. Should an epidemic prove refractory to the 50 per cent glycerine it is urged that a 60 per cent mixture be used but it is doubtful that a stronger solution will prove more effective.

Since we have been free from epidemics of this disease for some time now, this preliminary report is made with the hope that the method will be tried elsewhere for apparently the disease is quite common throughout the country and difficult to eradicate completely.

NOTE ON THE FORMATION OF AN ARTIFICIAL VAGINA

By Stephen Rushmore, M.D., Boston, Mass.

IN THE AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY for December, 1927, Frank and Geist describe an operation which is an adaptation of the pedicled tubular skin flap used with such remarkable success by Gillies and described in his work on *Plastic Surgery of the Face*. Frank and Geist used a single skin flap from one thigh, but suggest the possibility of using a flap from each thigh. There is herewith reported a case in which this suggestion was followed, with satisfactory anatomic result.

The patient (aet. 23) was first seen in the spring of 1927. She had a severe attack of pneumonia at fourteen, about the time it was expected that menstruation would appear. General health good. No pelvic symptoms. Patient has never menstruated nor has she had any molimina at any time. No bladder nor rectal symptoms. The patient is in apparently very good general health. Face of feminine type. No suggestion of beard, very slight down on upper lip. Thyroid cartilage perhaps rather prominent. No enlargement of thyroid gland. Body form of female type. Axillary hair development slight. The abdomen is normal. Escutcheon, feminine type, well developed. There is a slight prominence in each groin, due to a small subcutaneous tumor, which is movable, slipping down easily into the labium majus, but not upward into the abdominal wall. The inguinal canal is present, but shows no definite hernia. These tumors are about the size of normal ovaries, and are not tender. There is a hypertrophy of the labia majora which are fairly abundantly covered by dark hair (patient, brunette) and meeting in the median line so that . subjacent parts posteriorly are not visible until labia are separated; but anteriorly the clitoris is visible, hypertrophied, with glans not covered by prepuce, about three eighths of an inch in diameter.

On separating the labia majora, folds comparable to labia minora are very slight. In a depression the urinary meatus is visible, and posteriorly is another slight depression. No hymen can be made out. The posterior depression just admits tip of finger and on introducing a probe proves to be about half an inch in depth. Rectal examination showed no evidence of vagina, of uterus, nor of ovaries in the pelvis. No tumor in pelvis.

The patient stated that she wanted to get married and sought advice. Operation was not urged, and the patient left the office to think the matter over for the summer.

The patient returned July 20, 1928 and desired operation. The procedure was carried out in two stages, July 24 and September 29, 1928, the patient going home between the operations, and leaving the hospital finally in the third week in October.

The type of operation was that described by Frank and Geist, employing the modification suggested by them, of using a tubular flap from each thigh, instead of a single flap from one thigh.

The base of the flap was two inches from the median line; the flap was about two inches wide, and five inches long. The skin of each flap was dissected free (except at the ends), some of the subcutaneous fat cut away and a solid tubular flap formed by suturing the skin edges. The skin of the thigh was then under-cut and the edges approximated under the flap. The flaps healed perfectly except for slight inaccuracy of approximation of skin edges, from not cutting away quite enough fat. There was cutting in of the stitches in the underlying skin, and superficial infection, from too much tension, although it did not seem too great when the stitches were placed. The difficulty in healing, from these two factors mentioned, was a marked tendency of the underside of the tubular flap (line of suture) to adhere to the underlying granulation tissue. This presented however, no serious trouble. The circulation of the tubular flaps was always good.

The second stage of the operation was performed about two months later, September 29, 1928. A transverse incision was made near the posterior margin of the depression posterior to the urethra, and carried out about an inch on each side. This incision was gradually deepened, carrying it between urethra and bladder and the rectum until the peritoneum was reached. There was considerable bleeding which was pretty well checked by tying and by passing sutures and by packing with iodoform gauze.

The left flap was then cut free at its distal end, laid open along the line of original incision and trimmed of excessive fat and scar tissue. The transverse incision was then carried out along the anterior side of the base of the flap and around the base and posteriorly for about an inch and a half. The flap on the right side was freed in a similar manner, and then the two flaps sutured in the median line to form the new vagina, lined by skin and covered by fat. The upper end of the vagina was then drawn into place and held by a stitch of catgut, and the lower border of skin sutured to the vulvar skin. As there was still slight oozing, a strip of rubber tissue was placed posteriorly between the vagina and the rectum and removed in twenty-four hours.

The patient had asked that the hypertrophied elitoris be removed, which was then done. In the healing, which was by primary intention over about two-thirds of the lines of incision, there was no evidence of too much cutting off of circulation, or too much tension as at the first operation, although there was marked edema anteriorly in the region of the amputated clitoris, making the necessary catheterization difficult. There was very slight infection, so slight that it did not interfere with the result.

The anatomic result is a vagina which admits two fingers, is three inches deep and is surrounded by soft tissues which give the impression of easy stretching except in the midline, anteriorly. Perhaps if the vagina were rotated slightly on introduction, so that the line of sutures did not come in the median line, it might be better.

Whether the functional result is satisfactory has not yet been reported.

The operation has the disadvantage of a two-stage procedure with the intervening period.

The advantages of the operation are its simplicity and ease of performance; its range of applicability (any patient with normal thighs has ample skin for the two flaps); and the slight risk. There need be little hesitation on account of the danger, in contrast with the methods of intestinal resection. Whether it will generally prove satisfactory from the point of view of function, only further experience can determine.

520 COMMONWEALTH AVENUE.

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SECONDARY ABDOMINAL PREGNANCY

By T. E. Mendenhall, M.D., Johnstown, Pa.

THE following case of secondary abdominal pregnancy presents four or five interesting features of sufficient infrequency to be worthy of report. The case is as follows:

Mrs. R., aged twenty-six, pregnant for the first time. General health had always been good. Well developed and nourished, weight 130 pounds.

Menstruation regular, every twenty-eight days, lasting four or five days and unaccompanied by pain. Last regular period November 12, 1927, normal. Slight irregular spotting during the next six weeks.

December 31 she was seized with a sharp pain in the left lower quadrant. Was in bed four days and felt all right again except for soreness of left side. During this time, until March 3, she had three other attacks of pain, not sufficient for a hypodermic and confining her to bed for only two days each time.

On March 3 she was admitted to the hospital and first came under my observation. At this time she had a tenderness in the left lower quadrant and in the left vaginal fornix. She had all the symptoms of pregnancy, with the uterus enlarged to the size of a small grapefruit. No mass could be made out in the culdesac. Satisfactory examination was extremely difficult on account of the nervousness of the patient and the small, tight vaginal tract. At this time her urine and blood pressure were normal. R.B.C. 4,000,000 and W.B.C. 11,000. This condition cleared up rapidly and in four days she was allowed to go home.

April 21 she was readmitted with severe pain in the right lower quadrant and with frequency of urination. This pain was so severe that although the urine was normal it would suggest the possibility of kidney colic. An x-ray examination was negative as to renal calculus. At this time her R.B.C. had dropped to 3,620,000 and her Hg. to 75 per cent. W.B.C. 8,200. Again the pain cleared up and she was allowed to go home.

Readmitted June 9 with pair in right lower quadrant, temperature normal, pulse 100. During this time the mass which was apparently the uterus had enlarged to

the level of the umbilicus. Fetal heart sounds distinctly heard in the left lower quadrant. At this time the R.B.C. was 3,320,000. Hg. 70 per cent. W.B.C. 9,000. During all of these attacks of pain, the patient was always relieved by high enema.

During the last week of July, fetal heart sounds not obtainable and fetal movements ceased. At this time the patient had moderate uterine contractions, passed a slight amount of colored blood and some pieces of tissue which proved to be decidua. This cleared up in twenty-four hours and the patient's general condition was improving. From this time on until August 22 careful measurements showed that the size of the mass was decreasing and the patient's general condition was improving. Her Hg. had gone up to 80 per cent, R.B.C. 4,290,000, W.B.C. 9,800, poly. 77 per cent, lymphocytes 20 per cent.

At this time an x-ray picture was taken in an effort to show overlapping sutures, to determine a dead baby which we strongly suspected. The picture showed a baby in a transverse position with the head in the lower right quadrant. No overlapping of the sutures could be determined. Repeated examination failed to elicit heart sounds or movements. At this time the patient was given nitrous oxide in order that a more satisfactory examination might be made. It was now determined that we were dealing with an abdominal pregnancy and a definite diagnosis of dead baby was made.

Inasmuch as the general condition of the patient was improving, and in the light of recent reported cases presenting the advisability of waiting on these cases for placental separation, we decided to wait.

On September 8 laparatomy was done. The abdomen was opened in the midline from the symphysis to two inches above the umbilicus. The uterus was found somewhat enlarged, dextroverted and crowded forward a little to the right of the bladder. The right tube and right round ligament were found tensely stretching across the mass which filled the posterior part of the pelvis. The placenta was found attached to the posterior part of the right broad ligament, the posterior surface of the uterus and to the ascending colon. The adhesions and attachments were easily separated with little hemorrhage. In an attempt to deliver the entire mass the sack was ruptured with the escape of considerable dark brown fluid. The left tube and ovary were removed with the mass. The left tube had apparently ruptured in the outer third. A part of the sack, 6 by 10 cm. was left in position, firmly adherent to the ascending colon. The abdomen was closed without drainage.

The fetus was a female 43 cm. long, weight 1375 gm. It had the following deformities: right club foot, both right and left elbows markedly flexed and unable to be straightened. The placenta weighed 560 gm. The baby occupied a transverse position, the head being in the left flank.

The following are the chief points of interest in this case: (1) Usual signs of pregnancy. (2) Definite symptoms of tubal rupture but not of sufficient severity to warrant laparotomy. (3) Continued uniform enlargement of the uterus during the first three months. (4) Although this was a left tubal pregnancy, the major portion of the placental attachment was in the region of the right posterior surface of the uterus, the right broad ligament and the ascending colon. (5) At the time the baby perished, definite labor symptoms started and the decidua was passed. (6) During the interval between the death of the baby and the operation, the placenta had largely detached itself and was easily removed without hemorrhage.

MATERNITY HOSPITAL

A NEW GAS CONTROL VALVE FOR THE RUBIN TEST

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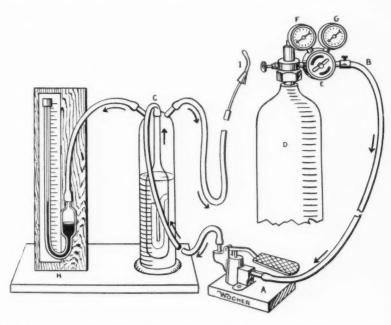
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BY GILBERT MOMBACH, M.D., CINCINNATI, OHIO Attending Obstetrician, Jewish Hospital.

 $T_{\rm a}$ Rubin test is by means of a small needle valve which when closed permits the gas to flow into the cannula, and which when open allows the gas to escape into the atmosphere. This valve is identical with the one used on the bulb of a blood pressure outfit. Such a valve requires really two hands to manipulate and often is responsible for minute leaks.

The author conceived the idea of placing a foot control valve (A) in the main gas line between the needle valve (B) on the tank and the inlet of the siphon flow meter (C). This valve is mounted on a heavy base which is placed at the foot of the examining table. The hose to and from this valve is of sufficient length to permit the valve to be placed at some distance from the tank. This valve is operated by a foot pedal which operates a spring controlled plunger. The removal



of the foot from the valve immediately shuts off the gas. Where a recording kymograph is used in conjunction with the Rubin outfit this valve has been found ideal. In those cases where it is desired to open tubes which are closed, such a valve is of inestimable value, as the gas can be instantaneously shut off, whereas with a hand operated valve an excessive pressure may be produced because of the difficulty of manipulating the hand valve. The advantages to be derived from the foot control valve are:

1. The Rubin outfit and tanks can be placed on a shelf or in a corner quite some distance from the examining table.

- 2. The operator has both hands free and can keep them sterile during the test.
- 3. Instantaneous control of the flow of gas.
- 4. The avoidance of excessive pressures due to the inability to quickly release the hand controlled valve.
 - 5. Minute leaks due to the hand controlled valve are avoided,
- 6. The valve is portable and it can be readily taken away from the examining table when the test is finished.

The author uses a kymograph to record the fluctuations of the manometer. He uses in conjunction with the above described foot valve a remote control switch which starts the electric driven kymograph. He is able at all times to do the entire test without the aid of an assistant.

526 PROVIDENT BANK BUILDING.

v. Varo, B.: Extirpation of Ovarian Tumors During Pregnancy. Monatschr. f. Geburtsh. u. Gynäk. 74: 28, 1926.

During the last twelve years among 22,750 obstetric patients in the first woman's clinic of Budapest, 30 cases were found complicated by ovarian cysts (0.13 per cent). During the same period of time, 695 women were admitted with a diagnosis of ovarian cyst and 30 of these women (4.1 per cent) were pregnant at the time of admission.

All but one of the 30 patients in whom an ovarian cyst complicated pregnancy were operated upon during the first half of pregnancy. Not one of these patients knew they had an ovarian cyst before pregnancy. In 4 patients both ovaries were removed during the first four months of pregnancy and in none was the gestation interrupted. Of the 30 cysts, 3 were dermoids, 3 were papillary carcinomas, and the remainder were simple serous cysts. In 3 cases torsion was present.

All the cysts were removed by laparotomy and all the patients received novatropin and papaverin for four or five days after operation to reduce the irritability of the uterus. In 90 per cent of the cases, pregnancy continued in spite of the operation.

The author believes that in every instance where an ovarian cyst is found during pregnancy, the cyst should be removed because it might cause a miscarriage or serious complications during labor and the puerperium. The danger of operation is not greater during pregnancy than it is at any other time. There were no deaths in this series. An operation for cyst complicating pregnancy should not be performed at a time when the menses would have appeared, were the patient not pregnant, because the uterus is most irritable at this time.

J. P. GREENHILL.

Society Transactions

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NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 12, 1929

DR. A. C. Beck reported a case of Spontaneous Rupture of Uterus in a Multipara With Specimen Showing Arrangement of Uterine Musculature.

Mrs. H. P., Italian, was admitted to the prenatal clinic of the Long Island College Hospital October 31, 1927, in the fourth month of her ninth pregnancy. Six of the previous pregnancies had terminated in the spontaneous delivery of living infants at term, twenty-one, seventeen, fifteen, eight, six, and two and one-half years before admission. Nine years ago she gave birth to an eight months' dead fetus and subsequently aborted at two and one-half months. During the eighth pregnancy she also was under the care of the prenatal clinic and received salvarsan and mercury on the recommendation of her family physician who had treated her husband for syphilis and believed that several of the older children were syphilitie. Prior to and following treatment her Wassermann test was negative. She entered the hospital June 23, 1925, and was delivered of a welldeveloped living child which was 52.5 cm. long and weighed 4300 gm. Labor was spontaneous and lasted four hours and thirty minutes. The history of this, the only previous labor conducted by our service, was quite normal, and following an uneventful puerperium, the patient and her child were discharged on the fourteenth day after confinement.

During the last five months of the ninth pregnancy she again was under the supervision of our prenatal clinic. Physical examination revealed no abnormalities. Pelvic measurements were as follows: interspinous diameter 29 cm., intercristal 31, intertrochanteric 33, external conjugate 20, diagonal conjugate not reached, biischial 9 cm. The Wassermann test was repeatedly negative and no other findings of syphilis could be discovered. As several of her children were being treated for syphilis in the syphilitic clinic, one course of salvarsan and mercury was given the patient during the last trimester.

Labor began at 10 P.M. on April 12, 1928. At 11:30 P.M. examination revealed a large child presenting as an L.O.A. position; the fetal heart was good, the cervix was 3 to 4 cm. in diameter; membranes were intact, the head was at level of the isehial spines; pains were strong and recurring at two- to three-minute intervals. At 11:45 P.M. the cervix was 5 to 6 cm. in diameter and severe pains were coming every two minutes. Preparations for delivery were made at once. At 11:55 P.M., following a very severe contraction, the pains ceased and the patient became pale and pulseless. Blood pressure was too low to be determined. Abdominal palpation showed the small parts to be closer to the abdominal wall than previously noted. The back of the child was easily made out on the left and the uterus could be definitely outlined on the right side near the umbilicus (Fig. 1). Rectal examination showed the head at the level of the ischial spines and apparently through the cervix. After gently pushing the presenting part upward a slight trickle of blood was observed to come from the vagina. A diagnosis of rupture of the uterus was made, and a quarter of a grain of morphine was immediately given.

At 12:20 A.M. a second dose of morphine was given in place of an anesthetic and although the patient was pulseless, the abdomen was opened in the midline below the umbilicus. The peritoneal cavity was filled with bright red blood and all but the face of the child was found to be outside of the uterus. After removing the child an extensive rupture of the uterus and left broad ligament was observed. The tear extended from the external os to a point almost on a level with the attachment of the left round ligament and included the uterine artery, the proximal end of which had retracted beyond view (Fig. 2). The left ovarian vessels were clamped with the left infundibulopelvic ligament and after stripping the bladder from the anterior wall of the uterus the uterine and ovarian vessels on the right side were similarly handled. The entire uterus was quickly

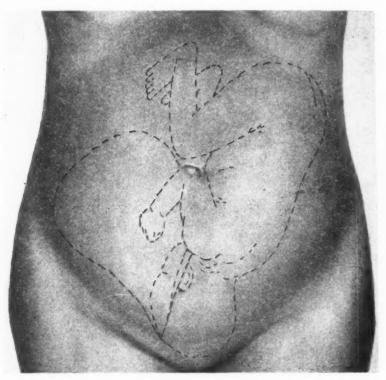


Fig. 1.—Findings on abdominal palpation after rupture of the uterus.

removed and the remaining bleeding points were eaught by forceps. Additional hemostasis was obtained by the use of three wide gauze packs. All clamps (16 in number) were left in place and protruded through the lower angle of the abdominal wound. The remainder of the incision was closed with two interrupted silkworm gut sutures. Immediately after the vessels were clamped 1000 c.c. of saline were given intravenously and a transfusion of 500 c.c. of blood was started. Before the patient was taken from the operating room her pulse was perceptible but could not be counted. The usual postoperative routine was carried out and at 4:15 A.M. her pulse was 150.

The clamps were loosened on the third day and removed twenty-four hours later without any evidence of hemorrhage. At the end of one week the removal of the gauze drains was started and a small amount was removed daily for ten

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days. The temperature was elevated for forty-one days. Throughout the first month after operation it reached a height of 103° to 104° daily. During this time the pulse varied between 140 and 120. After a protracted convalescence the patient was discharged from the hospital on the seventeenth of June, 1928. Examination at this time showed fair healing of abdominal incision, except at its lower angle where a sinus about 1 cm. in diameter was still draining. Vaginal vault was high and healed. On the left side a small insensitive mass could be felt. On the twenty-third of December, 1928, she was examined in the follow-up clinic where the following findings were noted: Fair abdominal wound, poorly healed in its lower angle, weak spot at drainage point, good pelvic floor. High well-healed vaginal vault. No parametrial tenderness or mass.

The child was well developed, 54 cm. long and weighed 4200 gm. Uterus was 24 by 12½ by 9½ cm. Left lateral aspect presented a tear extending from the level of the implantation of the round ligament to the external os. Retracted

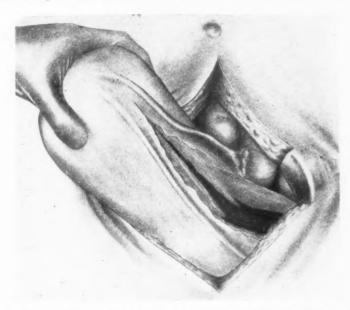


Fig. 2.—Appearance of rupture of uterus and broad ligament after child was removed.

wound measured 15 cm. by 6 cm. Muscle at site of tear presented a marked interstitial hemorrhage. Remainder of organ was normal. Placenta and membranes in situ. Former was implanted on posterior body and fundal walls and extended to site of tear. Myometrium remote from the site of trauma presented no departure from the normal and measured $2\frac{1}{2}$ cm. in thickness. Section made at site of tear showed microscopically the following: Membranes frequently revealed. Decidua thin but well shown. Capillaries markedly engorged. Myometrium hyperplastic and hypertrophied as in pregnancy. No evidence of sear formation. Tubes and ovaries normal. Corpus luteum of pregnancy present in right ovary.

Diagnosis.—Physiologic changes of pregnancy in uterus with uterine rupture. Tubes and ovaries normal. Several months later the specimen was again studied. At the site of the rupture the myometrium had retracted irregularly and revealed the peculiar interlacing of the muscle bundles shown in Fig. 3. These will be carefully studied in the hope that some accurate observations as to the muscular arrangement of the uterus may be made.

Comment .- The points of interest in this case are:

- 1. Spontaneous rupture of the uterus in a multipara who had previously given birth to 6 full-term infants without any difficulty.
- 2. Even though the tear in the uterus and broad ligament severed some of the large vessels, the patient did not die before laparotomy could be done.

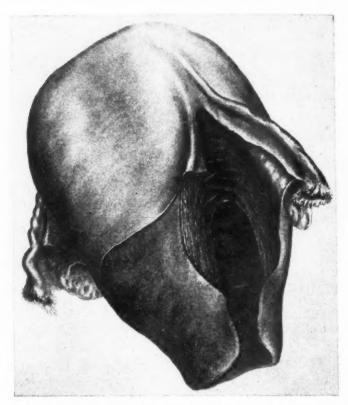


Fig. 3.—Uterus removed at operation, showing rupture and peculiar interlacing of uterine musculature.

- 3. Clamps may safely be left on vessels to be removed several days later when the patient's condition will not permit the use of a more finished technic.
- 4. The appearance of the tear in the uterus after fixation may give us a clue as to the arrangement of the uterine muscle fibers.

Dr. E. M. Hawks (by invitation) presented a paper entitled **Maternal Mortality in 582 Abdominal Cesarean Sections.** (For original article see page 393.)

DISCUSSION

DR. G. L. BRODHEAD had seen three cases of uterine rupture. The first was in the outdoor service of Post-Graduate Hospital in 1909, a para vi, thirty-seven years of age. She had had four normal labors and one abortion followed by a curettage. The curettage immediately preceded the labor during which the uterus ruptured. Labor came on at term and after some hours the woman complained of a very severe pain in the left side and told the doctor "the baby was born." He made a vaginal examination and found the cervix was about three fingers' dilated, just as it had been at the time of the last examination, but the patient's condition became steadily worse and she was brought into the hospital. The patient's condition resembled a concealed accidental hemorrhage, the uterus being very tender and in tonic contraction. As the head was presenting in the pelvis and the child was dead, craniotomy was done and a small fetus very easily removed. The fundus was at the level of the navel and the placenta was expressed easily. On passing the hand up into the uterus a rupture into the peritoneal cavity on the left side was found. An immediate laparotomy was done. As the tear was fairly clean-cut and there was very little bleeding, the uterus was sewed up and the patient made an uneventful recovery. The cause of this rupture may perhaps be due to too vigorous curettage after the abortion which preceded the labor.

The second case was also in the service at Post-Graduate Hospital in May, 1912. In this instance the patient was thirty-three years of age; she had had six normal labors and three abortions. The membranes ruptured five days before this labor. She was seen at 2:00 o'clock in the morning. The cervix was a finger and a half dilated. At 8:45 A.M. the patient went into shock after a very severe pain, and then all the pain ceased. Her condition became very serious and before the ambulance could reach the home, the woman died.

The third case was at the Harlem Hospital. This patient was thirty-five years of age, and had had six normal labors. The woman was eight months pregnant, and had had a premature rupture of the membranes. After twenty-four hours of intermittent pain she was brought into the hospital. There was a history of no fetal movements for a week. There was moderate dyspnea and slight cyanosis, a pulse of 110, and no fetal heart, apparently a breech presentation. The cervix was closed. A No. 4 bag was inserted at 10 P.M., and the next day as conditions had not changed the abdomen was opened. Floating among the intestines was a large anencephalic monster. The uterus showed a tear down the anterior wall about five inches in length, the uterus was well contracted, but it was removed by hysterectomy. The patient made a good recovery.

DR. A. H. MORSE had seen a case of ruptured uterus in a multipara, who was believed to be in the first stage of labor. She had a sudden attack of pain and was taken to the delivery room with the expectation that the head would appear on the perineum. Upon examination it was found that there was a rupture of the uterus. A hysterectomy was done immediately. The tear in this case was much like the one which was shown in Dr. Beek's specimen, namely, in the left hand side, extending from about the region of the broad ligament down into the cervix. There was no tear of the uterine artery. The operation was carried out without any great difficulty and the patient made a good recovery. He could find no evidence of a weakness in the uterine wall on that side, but there was this history: that when she was about three months pregnant, she went to a physician who attempted to do an abortion, apparently by curettage. The attempt was not successful and the patient went on. She also had a laparotomy because a physician had discovered a tumor not diagnosed as a pregnant uterus, but it seems the conditions in the pelvis were found perfectly normal.

DR. J. O. POLAK said he had had no experience with the Latzko operation, but had with the so-called exclusion operation, although the technic which he employed had been that known as the Veit-Fromme. The only criticism of the operation is the tardy involution of the uterus when it is repaired. Dr. Polak

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in rs e. d. now had five of these patients under observation with uteri that are well above the umbilicus, all complaining of metrorrhagia.

The other important point brought out is the reduction in the incidence of peritonitis. Dr. Polak believed that it was not due to the spill, because the spill can, with proper technic, be absolutely prevented, but the fact that the primary infection was an endometritis which extended through the suture line and infected the peritoneum, just as our abdominal wounds are infected along the suture line in the through-and-through suture. These cases have been minimized by the adoption of some form of flap operation, whether it be the Beck, Kroenig or DeLee type.

The third important point brought out was the question of local anesthesia. Dr. Polak believed that the more we develop its use, the more we are going to obviate certain things. First of all, we can control the convalescence much better, we can control the intestinal soiling much better and, with local anesthesia, which can be used with very little difficulty if one will only take the trouble to use it, neglected cases can be saved. Preeclampsias who are bad risk cases, are particularly suited to it.

The final results with so many men operating, are encouraging. Where there is only one man operating, he will get a very low mortality for several hundred cases, but in clinics where there are a large number of men operating there is bound to be a higher mortality.

Dr. A. C. BECK said that this paper was a triumph for the low operation. As we see various analyses from different parts, we are learning that some type of the low operation in any kind of a case that can stand operation, is the preferable type. For instance, Gordon showed that the mortality of the classical operation when done under elective circumstances, that is, on women who had not been in labor, or were just in labor, where the membranes were intact and no vaginal examinations had been made (the ideal case for section), was considerable, and that it was due to peritonitis.

Now, the low procedure, no matter how it is done, offers considerable protection against peritonitis, and therefore the classical procedure should be limited to those cases where the matter of time is an important consideration.

DR. S. J. SCADRON said that the cases of maternal deaths from tuberculous meningitis referred to by Dr. Hawks, were two unfortunate cases, yet interesting. They were unfortunate from the standpoint of fatality, but very interesting from the standpoint of diagnosis and their coincidence.

Both patients were sectioned within twenty-four hours. Both received spinal anesthesia. Both died from the same malady, one living three weeks postoperative and the other four weeks. There was no contraindication to general anesthesia. Spinal anesthesia was used because he had employed it with very good results and without untoward effects on the mother or the child.

Both patients were sectioned for contracted pelves. One was a primipara and the other was a repeated section.

The previous history of the first patient was interesting because she had had a tuberculous arthritis for seven years which had been treated. He pronounced her cured three years prior to her conception. The second patient gave no previous history of tuberculosis.

The first case was in labor for twelve hours previous to section. The second case was operated upon soon after her admission to the hospital, in labor.

The subjective symptoms postoperatively were practically uniform. For the first three days the patients complained of slight abdominal pain, and distention,

which was relieved on the third day, following an enema. On the third day postoperatively, the patients complained of headache, drowsiness, insomnia, and slept only at short intervals. They began to improve on the third or fourth day, but about the twelfth day postpartum they developed symptoms of meningismus, rigidity of the neck, headache, hiccough, photophobia, and vomiting.

The temperature of these patients was uniform. For the first week it was between 99.2 and 102.6; the second week between 98.6 and 101.6; the third week, in the first case, it was as high as 103, and in the second case, which lived one week longer, it ran exactly the same course.

A very interesting point was that the pulse never ran higher than 100. It usually ran between 60 and 88.

They had primary union in their wounds and were practically normal from an obstetric and surgical standpoint.

When the patients developed symptoms of meningismus, Dr. Seadron attributed this to the spinal anesthesia, and knowing that sometimes an ordinary spinal puncture causes meningismus, he then deemed it advisable to consult with a neurologist who confirmed the diagnosis.

DR. I. C. RUBIN said that Dr. Polak's remarks about the low mortality rate at the Nursery and Child's Hospital may be partly explained by the fact that the hospital is chiefly an obstetric hospital; that there is a minimum amount of gynecology done in proportion to obstetrics; and that the gynecologic operations that are done there are done almost exclusively on clean cases. There are very few infections postoperatively. Now, that perhaps is a fact that may be overlooked in accounting for the relatively low mortality, a mortality which is particularly low as regards peritonitis and sepsis. Sepsis was almost absent with the exception of one ease out of that whole series, and peritonitis is getting more rare.

DR. HAWKS (closing) said in reply to Dr. Polak's question as to high fixation of the uterus following the operation of peritoneal exclusion that in the one case with the uterus fixed high, so that the fundus was at the level of the umbilious, the patient had no complaints.

NEW YORK OBSTETRICAL SOCIETY

MEETING OF MARCH 12, 1929

Dr. Samuel H. Geist read a paper entitled **The Morphology of Normal Menstrual Blood and Its Diagnostic Value**. (For original article see page 321.)

Dr. T. E. Lavell (by invitation) presented **The Diagnosis of Ectopic Gestation**. (For original article see page 379.)

DISCUSSION

DR. HOWARD C. TAYLOR said with reference to the large number of cases operated upon the first day when patients appeared in the hospital, that this was unusual in his service and that the actual number of cases operated upon immediately is a much smaller percentage than Dr. Lavell had shown. It is agreed that when a positive diagnosis of ectopic pregnancy is made there is nothing to be gained by waiting. On the other hand, there are a large number of cases where

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we have the possibility of pregnancy in mind, but recognize also that it might not be ectopic pregnancy but an acute inflammatory condition and there certainly is no harm in waiting for a considerable length of time. Dr. Taylor's custom is not to hurry the operation for ectopic pregnancy unless it is a shock case where there is a possibility of bleeding still going on. The percentage of error in diagnosis is interesting, too, and probably is about the same as others have. It would be interesting if we could know the number of cases operated upon with a diagnosis of ectopic and something else was found.

DR. S. H. GEIST asked whether there were any data on the frequency with which uterine casts were expelled and when in relation to the operation or to the initial bleeding, these casts were obtained.

A second question is one relative to the nonbleeding cases. In what proportion of those cases were the ectopics presumably alive? That is, a perfectly viable fetus or nonrupture, or abortion in the tube, and in what proportion of those nonbleeding cases pain was absent.

DR. H. C. COE was sure that in working at Bellevue Hospital and elsewhere he had come across cases of true tubal abortion which were cured without operation, and also cases of apparently tubal abortion, which suggested to his mind the old question of tubal menstruation. It may be rather an old-fashioned idea, but he believes that under certain conditions it is possible for the tubes to extrude menstrual blood from the distal ends. Such cases are not ectopics, as shown by examination of the blood and of the tubes. He sees no reason why we should not have a tubal menstruation which simulates tubal abortion.

Of course, there is no question about operating immediately on patients where the diagnosis has clearly been made, but there are so many different kinds of ectopics and so many different conditions under which we see the patient (at least we used to do so at Bellevue Hospital), that it is difficult to lay down any hard and fast rule with regard to operation.

DR. WALTER T. DANNREUTHER said that one frequent symptom which was not mentioned, is the sensitiveness of the cervix on manipulation. In his experience, this was found more often than exquisite sensitiveness of the mass itself.

It has always seemed to him that the symptom-complex in a particular case of ectopic pregnancy can well be correlated with our conception of the underlying pathology. For example, in the early cases with slight hemorrhage and complete extrusion of the gestation sac into the culdesac, we expect the symptomatology to be meager. Patients suffering from small repeated hemorrhages more often conform with the classic textbook clinical picture, and often complain of soreness in the lower abdomen between acute attacks of pain. In case of sudden rupture of the tube, the patient is precipitated into a stage of shock, the so-called tragic state of the disease.

The treatment of the several groups of cases is well predicated on the symptomatology and the type of pathology presented. Within the past two months a patient under observation in the ward for purposes of differential diagnosis manifested signs of mild shock while being given an enema. The change in her condition was recognized, and the patient was operated upon immediately. Laparotomy revealed a tubal gestation sac which previously probably had not existed. Two weeks later Dr. Dannreuther operated upon another patient, having made a definite diagnosis of ectopic pregnancy after careful study, and found no pregnancy at all. All patients presenting symptoms which arouse suspicion of a tubal pregnancy should be confined to the hospital under close observation until the differential diagnosis has been established.

DR. LAVELL (closing) said that the paper was purposely limited to the features which had a bearing on diagnosis.

The operative death rate was 2.68 per cent and is influenced a good deal by the type of case. Bellevue has a very active ambulance service and receives many cases in shock. Many have died on the way to the hospital, or within a few minutes after admission. The policy is to operate as soon as possible after a diagnosis is made, although there is a great advantage in some preliminary rest and treatment for the more serious cases.

In reply to Dr. Geist's question, he found that decidual easts are very seldom reported by the patient and seldom seen in the hospital. In regard to the viability of the fetus, it is to be remembered that these are practically all early cases, and practically all ruptured or aborted. The full-term or viable ectopics are taken care of on the Obstetric Service.

A past history of severe pelvic infection was very, very rare. Often there had been symptoms suggestive of mild chronic infection. However, there were very few that had previously been on our own ward for infection. Their impression in this series is that the type of infection that predisposes to ectopic is very mild. Probably if it is severe, it causes sterility, or a hysterectomy or salpingectomy is done following the infection.

In answer to Dr. Kosmak, in no case was a salpingostomy done for unruptured ectopic. Most of these cases had partial or complete salpingectomy.

Relative to Dr. Ward's discussion: they did not make daily blood counts with the idea of differentiating hemorrhage from infection. If there is a leucocytosis, he would rather rely on other signs to differentiate between acute hemorrhage or infection. The sedimentation test is more reliable to indicate not only the presence but the degree of infection, but he felt that the red blood count, hemoglobin estimation, blood pressure reading, and symptoms of the patient give us better information about hemorrhage than the white blood count.

Dr. Lavell agreed with Dr. Grad on the value of colpotomy. Not only is it necessary to clear up a doubtful diagnosis, but it is a measure of safety to avoid doing a laparotomy on a dangerous type of acute infection. However, from the standpoint of abstract diagnosis, it is not advisable to depend on any method of exploratory operation.

Dr. Lavell had not practiced the method of retransfusion mentioned by Dr. Grad. Some years ago the custom was to fill the abdomen with saline in exsanguinated cases, but now we try to give a transfusion during the operation or shortly after. If blood cannot be obtained soon enough for this purpose, we give them a saline infusion during the operation, and practically all have a hypodermoelysis and Harris drip as soon as they reach the recovery room.

In reply to Dr. Dannreuther, he said he found it very hard to tabulate the number of cases that had a tender cervix, partly because the examiner so often failed to mention it. His own opinion was that a cervix which is painful on motion is suggestive, but not characteristic of ectopic and is found much more frequently in acute or subacute inflammation. If these can be ruled out, the sign becomes increasingly significant.

He was not able to find many cases where the examiner described a pulsating mass and believed that this also is more common in inflammatory conditions than in ectopics. There seems to me no reason why a ruptured or aborted ectopic should have an expansile pulsation, although any mass may transmit a pulsation from the large pelvic blood vessels.

Neither did he consider a soft, or blue, or patulous cervix as really characteristic of ectopic. In fact, these were not mentioned very many times in this series.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Selected Abstracts

Pregnancy and Disease

Ratner, Jackson and Gruehl: Transmission of Protein Sensitiveness from Mother to Offspring. J. Immunol. 14: 249, 267, 275, 291, and 303, 1927.

In a series of five studies the authors offer an explanation for the underlying basis of allergic reaction at times occurring in early infancy as a result of contact with a food for the first time.

There is clinical evidence that sensitization may be transferred from mother to offspring. The conception of earlier investigators was that the placenta, irrespective of animal species, was impermeable to protein and did not permit the passage of maternal antibodies except it was injured either through disease or heterologous proteins such as horse serum antitoxin often employed in these experiments. They therefore contended that placental transmission of antibodies was a pathologic and not a physiologic process. From their own study the writers arrive, however, at the conclusion, that this interchange is a physiologic one and is brought about largely by means of mechanical filtration. This placental permeability occurs consistently in the human being with such substances as protein sensitizing antibodies, antitoxins, agglutinins, precipitins, bacteriolysins, chemical blood constituents, etc. The theory of placental transmission of immune bodies as a result of placental injury has become untenable. Evident differences in this respect between the human and certain animals shown in experiments are seemingly plausibly explained by the fact that in the human placenta the maternal blood is separated from the fetal by a single cell layer, whereas e.g., in the case of the ruminants the placenta consists of three cell layers.

The second paper of the series deals with the possible transference of such substances through the colostrum. While an essential medium for the transmission of immunity from a mother ruminant to her newborn (goats, and cattle), colostrum plays only a neglible rôle in this respect in rodentia (guinea pigs and rabbits) and in the human species. There is no work recorded in literature on the transmission of protein hypersensitivity through the colostrum.

Turning next to the rôle of milk played in this respect these authors state that there are certain clinical indications which have suggested the possibility that the breast milk of the mother might transmit foreign proteins and thus produce nutritional and allergic disturbances in the nursling. In their own experiments on guinea pigs they were unable to reproduce such passage of proteins. They conclude that for the present this question must be answered in the negative. An analysis of literature dealing with the passage of immune and other bodies through breast milk reveals a mass of experiments that at first hand seem contradictory. An evaluation of succeeding experiments, however, demonstrates quite clearly that many antibodies do enter the milk of nursing mothers although always in lessened amounts but that in only a few instances do these milk-borne antibodies gain

entrance into the suckling's body and then persist there only for an extremely short time. With the human being, the overwhelming evidence is definitely against the passage of agglutinins into the nursling through the milk.

Passive sensitization of the offspring is clearly proved by their experiments with mother guinca pigs made sensitive to horse serum before conception. The offspring will be born sensitive to this same substance. This phenomenon is due solely to placental transfer and is in no wise hereditary. This state of hypersensitiveness is transmitted to successive litters. It is a passive state and disappears later.

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As shown in the last paper of the series, the fetus in utero can also be actively sensitized. The actual presence of protein traversing the placenta and entering the fetal circulation does not necessarily mean that the fetus has become sensitized to the protein. This is fully shown in the protocols of their experiments. It proved to them a very difficult task to actively sensitize the fetus in utero as compared with the simple task of demonstrating the passive transfer of antibodies.

They conclude that active and passive sensitization of the fetus offers a probable explanation for the occurrence of allergic manifestations in infants that come in contact with a protein for the first time.

HUGO EHRENFEST.

Sano, J: The Resistance of the Gravid Animal to Various Kinds of Bacillus Toxins. Japanese J. Obst. & Gynec. 10: 17, 1927.

It is recognized that the gravid animal has a weakened resistance to bacillus toxins. This decrease in the resistance might be due to special conditions accompanying pregnancy, such as abortion or the incident blood loss, or to marked anatomic changes in the uterus. But even in the pregnant animal, not aborting and without recognizable uterine change, there exists this diminution in resistance. Thus it must be inferred that the fundamental cause is supplied by pregnancy itself.

Whether this reduced resistance is connected with the vitality of the organism during pregnancy, is a difficult problem to settle, but the results of the author's experiments offer a clue. It was noted in the first series of experiments that when intoxication was mild the gravid animals had fewer symptoms than the nongravid animals. In the second series of experiments it was seen that the hypertrophy and hyperplasia of the reticuloendothelial cells was frequently and especially marked in the gravid animals. In the third series of experiments it was seen that in the case of weak intoxication leucocytosis was more marked in the gravid than in the nongravid. These facts indicate an increase of vitality in the gravid animals. In the majority of cases, on the other hand, their resistance was inferior to that of the nongravid animals. It may be inferred that at the time of pregnancy there are increasing burdens imposed on the maternal body, such as the nutrition of the fetus or the equilibrium of metabolism, and thus all the organs are in a state of stimulated energy. The constant stimulation, however, leads to insufficiency in reserve energy, so that once intoxication is heightened or prolonged, the whole organism is apt to yield to the invasion of the toxin. In short, during pregnancy much less surplus energy is available than in the nonpregnant state, and consequently the invasion of toxins is rendered much easier.

J. P. GREENHILL.

Goldschmidt, H: The Development of the Newborn During Sickness of the Mother. Klin. Wchnschr. 6: 207, 1927.

Since nothing can completely replace mother's milk as the ideal nourishment for the newborn, the author investigated the results obtained by keeping newborn babies at the breast in spite of various types of infectious diseases of the mother which have usually been looked upon as contraindications to nursing. The only precautions necessary are first that the maternal milk shall not be infected or contaminated and secondly that in infectious diseases of the respiratory tract, the mother's mouth and nose shall be masked during nursing.

In the grippal infections, 91 per cent of the babies had only mother's milk and 50 per cent of these passed their birth weight in less than twenty days. Pneumonia decreases the milk supply of the mother to a considerab'e extent, only 37 per cent having sufficient breast milk. Of these babies 72 per cent regained birth weight in twenty days. The only justification for stopping nursing in cases of pneumonia, where the milk supply is sufficient, is extreme weakness of the mother.

Of the 32 cases of mastitis studied, 57 per cent thrived on breast milk alone. The author has never seen any harmful effect from allowing a baby to continue nursing in these cases. The only contraindication is pus contamination of the milk or an erysipeloid infection involving the nipple.

There were 65 cases suffering from endometritis, parametritis, thrombosis or thrombophlebitis but 42 nursed their babies completely. These conditions do seem to have a harmful effect upon the babies in that only a small percentage regained their birth weights.

Those mothers who were suffering from gonorrheal infections or from syphilis were allowed to nurse and all of their babies parsed their birth weights during the first three weeks. Breast feeding is especially valuable in cases under antisyphilitic treatment. In eclampsia the author considers it well to allow several days to clapse after an attack before putting the baby at the breast.

RALPH A. REIS.

Pineda, E. V.: The Presence of Mycobacterium Leprae in the Placenta and Umbilical Cord. J. Philippine Islands M. A. 8: 67, 1928.

Of 104 placentas examined, 57 (53 per cent) were found positive. In 25 cases (24 per cent) the organism was also found in the cord blood. In only one case was the organism found in the cord and not in the placenta. Histologic examination of placenta and cord showed no pathologic changes attributable to leprosy.

The bacillus of leprosy reaches the fetus in a considerable proportion of cases, although in the majority it is probably finally overcome. Intrauterine infection in leprosy should be considered in some cases, particularly when the disease develops in early infancy.

C. O. MALAND.

Hitzanides, E.: The Influence of Dengue Fever on Pregnancy and Labor. Bull. Soc. d'Obst. et de gynéc. 18: 133, 1929.

When dengue is contracted by a pregnant woman in the first half of pregnancy, abortion may result but when the disease is acquired later in pregnancy, the gestation remains unmalested. Atortions were not determined by the severity in the cases seen by the author for in many severe cases the pregnancy continued uninterrupted whereas in some mild cases, abortions occurred. Dengue produced hemorrhages in pregnant women which lasted from a few days to a few weeks. When an abortion occurred it usually did not take place at the height of the attack but later during a remission which varied from several days to a few weeks.

In the observed cases, the duration of labor was normal. In some cases large clots were found adherent to the maternal surface of the placenta and sometimes uterine inertia was present. All the cases but one had normal involution of the uterus. When dengue is contracted for the first time during the puerperium, it

may be difficult to differentiate it from puerperal sepsis. However, in dengue, bradycardia and leucopenia are constant findings. In two cases the newborn babies had dengue.

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J. P. GREENHILL.

Rhenter and Savoye: Nine Cases of Typhoid Fever During the Puerperal State. Bull. Soc. d'obst. et de gynéc. 18: 242, 1929.

In an epidemic of typhoid fever in a suburb of Lyons, nine cases occurred in women who were pregnant or had recently been delivered. Two were serious cases and seven were mild. Pregnancy was interrupted only once among seven pregnant women. Two children died during pregnancy and both mothers of these children likewise died. Hence fetal mortality is evidently associated with severity of the disease. No connection was found between the duration of pregnancy and the frequency of interruption of pregnancy. All the children born alive were in good condition and of normal weight.

J. P. GREENHILL.

Phillip: The Latest Knowledge and Treatment of Syphilis in Mother and Child. Ztschr. f. Geburtsh. u. Gynäk, 93: 442, 1928.

In Berlin about 6 per cent of the obstetric clinical material is syphilitic. The infection of the fetus occurs through the placenta at about the fourth or fifth month. Ninety-five out of 100 untreated syphilitic mothers will bear syphilitic children. When the mother is treated before pregnancy, 78 per cent of children will be infected. If the mother is treated during pregnancy only 22 per cent of the children will have syphilis.

The diagnosis is difficult because the pregnancy may cause a positive Wassermann reaction. The author uses three methods on each patient, the Wassermann, Meinicke and Sacks-Klopstock, and if two or all three are positive the diagnosis most certainly is syphilis.

The scrologic reaction in newborn syphilitic children is negative in 80 per cent. It does not become positive until some time later. The diagnosis may be more easily made by examining some of the tissue fluid, taken from the cord near the navel, by the dark-field method. A negative result does not mean a healthy child. A further help is the x-ray appearance of the child's bones if they show a syphilitic osteochrondrosis,

It is of the greatest importance to treat the syphilitic mother early in pregnancy and, if possible, before the fetus is infected.

FRANK A. PEMBERTON.

Almkvist, J.: Has the Impossibility of Direct Transmission of Syphilis from Father to Fetus Been Proved? Wien. klin. Wchnschr. 42: 97, 1929.

Matzenauer in his article on "The Inheritance of Syphilis," in 1903, made the statement that "a transmission of the disease directly from father to child has not been proved." Almkvist maintains that "not proved" does not mean "impossible," and deplores the tendency of the profession to accept the statement as dogma, making no allowance for exceptions. He cites 67 cases of women who have borne syphilitic children, 28 of whom knew nothing of a syphilitic infection. Of these, 5, or about 7.5 per cent of all the cases, showed no signs of the disease, clinically or serologically, on repeated examinations. One of the 5 has been studied for fourteen years and has had 36 examinations both clinical and serologic during this period, with entirely negative results. Ten years after bearing a syphilitic

child, the patient, by a second marriage, bore a normal healthy child which has never shown evidence of syphilis. At no time had the patient had antisyphilitic treatment. The author points out that the above case must lead us to entertain the possibility of direct transmission from father to child, and pleads that indiscriminate antisyphilitic treatment be withheld from prospective mothers who have previously borne syphilitic children but who show no stigmas of the disease.

FRANK SPIELMAN.

Powell and Davey: A Case of Post-Partum Anemia. British M. J. 2: 1131, December 22, 1928.

A woman, aged thirty-five, who had no previous illness (except appendicitis, cured by operation at age of twenty-three) was delivered of her first child in 1918. Labor lasted three days and was followed by a severe postpartum hemorrhage. Baby lived only a few hours. Patient ran a temperature for several weeks, was anemic and suffered with severe headaches. Coli found in urine at that time. A right iliae pain for three months following was attributed to a right ovaritis.

A few days before last pregnancy, November 3, 1926, coli bacilli again found in urine, for which urotropin was administered. Delivery was a breech, apparently normal, placenta was delivered easily. No postpartum hemorrhage. The next day she had severe frontal headache and looked alarmingly anemic. Blood picture of the pernicious type, at that time was: Hgb. 34; R.B.C. 1,603,000; color index 1.1; W.B.C. 6,500; P.M.N. 70.3 per cent; Lymph. 20.3 per cent; Large mono. 4.7 per cent; Eos. 4.0 per cent; Mast cells 0.7 per cent. Physical examination negative. Two blood cultures negative. Temperature rose to 101°. About three weeks postpartum blood picture was: Hgb. 25; R.B.C. 1,290,000; color index 1. Gastric content was devoid of any HCl. The patient was transfused with 470 c.c. citrated blood and felt much better. Gastric content several days later showed achlorhydria. Patient is now twenty-three months after the confinement, apparently in perfect health taking hydrochloric acid regularly. The blood shows no evidence of pernicious anemia.

The case described fulfills all the conditions necessary for a diagnosis of true pernicious anemia. Larrabee (1925) reported 17 cases of severe anemia shortly after pregnancy, not attributable to other causes. In eight of these the blood pictures were of the pernicious type; only four were transfused and recovered, three of the others died. One transfusion may check the progress of the disease. In others, repeated transfusions may be necessary.

ADAIR AND LAUGESON.

Balfour, Margaret I.: The Anemia of Pregnancy. Indian Med. Gazette, 62: 491, 1927.

It has long been known that severe anemias occur during pregnancy, but it is only since the beginning of the present century that a distinction has been made between the anemia of pregnancy and ordinary pernicious anemia. The main points which indicate the difference in the former are the shorter duration, the absence of marked remissions and exacerbations, and the frequently favorable termination when the pregnancy is ended. Modern medical literature refers to the disease with increasing frequency. Only Bombay cases, 150 in number, are referred to in the article.

In more than half the cases a definite history of sudden onset was given, with various symptoms, pyrexia, enlargement of the spleen, edema, diarrhea, vomiting, other than the vomiting of pregnancy, sore tongue, epistaxis, and weakness. The patient usually entered the hospital in a condition of severe anemia after a month

or six weeks' illness. With rest in bed, good diet, injections of iron and arsenic, some patients improved but frequently there was no improvement. Delivery was usually premature. In some nonfatal cases recovery was rapid after delivery, while in others the anemia lingered. Forty-two per cent of mothers died and 53 per cent of infants were stillborn, while 15.3 per cent of infants died a day or two after birth. The etiology is not known.

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C. O. MALAND.

Broich, H.: Severe Epistaxis During Pregnancy. Monatschr. f. Geburtsh. u. Gynäk. 71: 25, 1925.

Mild epistaxis is a rather frequent occurrence during pregnancy, due to a physiologic swelling of the nasal mucosa. Even large nosebleeds may produce no disturbance in the healthy gravida as exemplified by two cases reported by the author. A few authors have described a disease called pernicious-like anemia of pregnancy. In these patients nosebleed is a frequent symptom. The cause of this anemia is a pregnancy toxemia. Another type of anemia is due to chronic In these cases of anemia, termination of pregnancy is essential thrombopenia. indicated. In cases of thrombopenia operative procedures are dangerous because of the increased bleeding time. Attempts should be made to check hemorrhage by injections of corpus luteum extracts and coagulants. Transfusion of large amounts of blood is useless because the transfused blood is destroyed within twenty-four to forty-eight hours. In cases of chronic anemia small transfusions of citrated blood are much more effective. The author used 15 c.c. of the husband's citrated blood as a trial biologic transfusion, but the patient died three hours after the injection. Hence an intravenous transfusion of even a very small amount of blood should be done only for a very strict indication.

J. P. GREENHILL.

Rosenloecher, K.: Edema of the Uvula Immediately after Labor. Monatschr. f. Geburtsh. u. Gynäk. 79: 197, 1928.

Hofbauer was the first to point out changes in the pharynx during pregnancy. He found small celled lymphocytic infiltration, superficially and deep, associated with vascular dilatation and edema of the tissues. The author reports a case of edema of the uvula which occurred about fifteen minutes after the spontaneous birth of a child. The entire labor had lasted twenty-three hours. The first symptoms were dyspnea and mild cyanosis. Inspection of the throat revealed the uvula swollen to the size of a thumb, pale red in color, and rubbery in consistency. The tongue and gums appeared normal. Ice was administered and gargles of astringent solutions were used. The symptoms disappeared after fifteen to twenty minutes and the uvula regained its normal size in forty-eight hours.

J. P. GREENHILL.

J. P. GREENHILL.

Spiegler, R.: Bronchial Asthma and Pregnancy. Monatschr. f. Geburtsh. u. Gynäk. 79: 193, 1928.

The author reports two cases of bronchial asthma in the first of which the asthma disappeared completely during pregnancy whereas in the second the asthmatic attacks returned with the onset of pregnancy after an absence of onc year. In the latter case, the asthmatic affliction vanished after the sixth month. This observation furnishes further support for the contention that the vegetative nervous system can produce abnormal reactions during the first half of pregnancy.

Hoehne: The Care of Edema of the Vulva in Pregnancy. Deutsche med. Wchnschr. 51: 57, 1925.

This is a report of 5 cases of excessive edema of the vulva. In the first the skin became necrotic and infected; labor was normal but the patient died from a streptococcus infection of the vulva and peritoneum. In the second case a simple cesarean was planned but the skin broke down and a Porro operation had to be done. In the third case an extraperitoneal cesarean was done before the skin had broken down, with satisfactory result. During this operation a large amount of fluid was drained from the vulva tissues. The fourth patient had nephritis and fluid was pouring from an ulcerated place caused by pressure in the left small labium. A transperitoneal cesarean in the lower uterine segment was done, the mother making a good convalescence but the child dying of pneumonia. The fifth case had enormous edema of the vulva at the end of the eighth month, The author made a transverse incision above the pubes on the right, applied pressure to the whole vulva for half an hour, squeezing a large amount of fluid out through the wound, then closed the wound leaving a rubber tissue drain, and continued pressure on the vulva. During the next two days fluid drained out, the vulva edema went down to a large extent, and then was kept within reasonable bounds by pressure compresses until delivery. She was delivered normally and made a good recovery.

Such excessive edema is dangerous because of the likelihood of necrosis and infection. The treatment as described in the last case is efficient.

F. A. PEMBERTON.

Balard, P.: Treatment of Suppurations on Vulva and in Vagina during Pregnancy and Labor. Rev. franc de gynée, et d'obst. 19: 465, 1926.

The author reports 33 cases of suppuration of vulva or vagina during gestation. Most frequent were Bartholin gland abscesses and suppurating vaginal cysts.

During labor Bartholin abscesses form only a slight obstacle due to edema but they favor perineal lacerations. Since serious consequences may arise in the puerperium, the author advises removal of these abscesses between the second and sixth months. Extirpation of the gland done at such times never was followed by interruption of pregnancy but when the infected gland was removed between the seventh and ninth months, premature labor resulted in a few cases, and one patient died from infection. Opiates should be given before and after the operation to prevent the premature termination of pregnancy. If no operation is performed, hot, moist dressings should be applied, vaginal douches given and vaccinotherapy used.

Pregnancy favors the enlargement of vaginal cysts and predisposes them to inflammation and suppuration. Labor often causes a rapid increase in their size. Unless very large, vaginal cysts do not interfere with pregnancy but they may cause dystocia. They usually require no treatment and often rupture spontaneously.

Infection following a ruptured suppurating vaginal cyst is rare. The benignity of this condition, therefore, contrainflicates any intervention during pregnancy. During labor, if there is dystocia, the cyst may be punctured.

J. P. GREENHILL.

